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USSR Report

MACHINE TOOLS AND METALWORKING EQUIPMENT

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USSR REPORT

MACHINE TOOLS AND METALWORKING EQUIPMENT

CONTENTS

INDUSTRY PLANNING AND ECONOMICS

CEMA CO-DEVELOPMENT OF NEW PRODUCTION TECHNOLOGY SURVEYED

Co-Development of Flexibile Manufacturing

Moscow EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV in Russian No 8, Aug 85, pp 2-18

[Article: "Key Area of Cooperation"]

[Text] A powerful machinebuilding complex has been created at present in fraternal countries. This made it possible to practically fully meet the requirements of their national economies in the latest high productivity equipment and create a considerable export potential. Today, the output volume of machines and equipment in the total volume of industrial products in the USSR and European countries -- members of CEMA have achieved the level of leading capitalist governments.

Constant attention on the part of central party and government organs to the development of this and other basic sectors makes it possible to strengthen the economic and scientific technological potential of the fraternal countries, implement large social programs, provide a stable increase in the people's welfare, a further uplift in science, education, culture, health safety and social security. New prospects for the accelerated development of machine-building were outlined on the highest level by the economic conference. Having analyzed the present situation, the conference participants came to a unanimous opinion: the leading link in the economic strategy of the modern stage and in the foreseeable future are the acceleration of scientific technological progress and the most rapid introduction of achieved results.

This past year, proved the correctness of the course put forward by the leaders of the fraternal parties. As noted at the conference of the CEMA secretaries of the Central Committees of the fraternal parties on economic problems, held in May 1985 in Moscow, much work was done in the CEMA and the Soviet Union on implementing the measures specified by the economic conference. These measures are directed toward a further uplift in the national economy, improving the structure and technical standards of leading industrial sectors, especially, machine building.

As is well-known, at present in the CEMA countries, possibilities for extensive growth were objectively reduced due to a turnover in new additional resources of materials, labor, fuel and energy. In this connection, active renovation of production facilities, reequipment of leading sectors and their modernization are in the forefront.

V. I. Lenin stressed: "to expand production..., it is necessary first to produce the means of production, while for this it is necessary therefore, to expand that part of the social product which manufactures the means of production and it is necessary to divert to it workers who already demand consumer goods." V. I. Lenin pointed out further that consumption develops after accumulation.

The extreme importance of equipping the national economy with the latest equipment was also noted in the April (1985) Plenum of the CPSU Central Committee, "The decisive word here," stated Comrade M. S. Gorbachev, General Secretary of the CPSU Central Committee, "Is machinebuilding. Its development must be given priority... The main problem is to changeover rapidly to the production of new generations of machines and equipment which are capable of introducing progressive technology, increasing the productivity of labor many times, reducing material consumption and increasing the output-capital ratio. High priority attention must be given to improving machine tool building, accelerating the development of computers, instrument making, electrical equipment and electronics as catalyzers of scientific technological progress."

To solve successfully the cardinal national economic problems of greater and greater importance in recent years requires, in the CEMA framework, multisided scientific technological and production collaboration in selected high priority directions. It stresses as the main ones the areas which determine the scientific technological progress, of a comprehensive, multisector nature and make it possible to obtain maximum economic effect.

The 34th meeting of the Council formulated as high priority a number of directions in machinebuilding, radio equipment and the electronics industry. The 99th and 102nd meetings of the Executive Committee of the Council approved specific measures for their implementation. Interaction was outlined along the priority directions according to the comprehensive program of scientific technological development for 15 to 20 years.

Priorities which play a constantly increasing role in future collaboration are microelectronics and microprocessers. Here the efforts of the countries are concentrated on the development, organization of specialized and cooperative production and mutual deliveries of integrated circuits including also large scale microprocessor circuits (over a thousand items), as well as special technological equipment (178 items) and especially pure and semiconductor materials for their manufacture (218 items).

In 1984, the Permanent CEMA Commission on Collaboration in the Area of Radio Equipment and the Electronics Industry approved a standard nomenclature for

microcircuits and single lists of equipment and materials that must be used for all new CEMA developments. At present, over 70 percent of the nomenclature for integrated circuits, equipment and materials are included in existing agreements on specialization and cooperation and transactions for their extension for 1986-1990.

Cooperation in the area of computers acquires special importance. Its purpose is the creation and wide introduction into the national economy of single systems of electronic computers (YeS-EVM) and small computers (SM EVM), built on a common component base that have program and apparatus compatibility.

During the years of the CEMA cooperation, over 300 technical and about 100 software facilities were created, which made it possible to meet practically fully requirements in these types of high productivity modern equipment by their own production and mutual supplies. To a great extent, this is a result of close contacts between scientists and specialists of fraternal countries within the framework of the Intergovernmental Commission on Computers; due to their carrying out a single technical policy; development and output of a developed nomenclature of machines and software; training of skilled personnel; and an informational and economic base for their application.

The consolidation of effort made it possible for the fraternal countries to start the solution of a number of the most important national economic problems and, first of all, the comprehensive automation of production, and to achieve the acceleration of scientific technological progress.

Robot equipment is another important direction in machinebuilding. The problem is to satisfy most fully the CEMA requirements in industrial robots, standard modules, units, parts and fixtures that would make it possible to compose robotized technological complexes.

At present, the CEMA Committee on Scientific Technological Cooperation developed a concept for the technical development of the sector and the nomenclature development for the manufactured products. On the day's agenda is the preparation and organization of their specialized and cooperative production.

As noted at the 40th meeting of the CEMA, of special importance for the intensification of production is the rapid and continuous renovation of all sectors of the national economy on the basis of the modern achievements of science and technology flexible production systems (GPS). They belong to the new generation of production facilities and represent integrated, computer controlled complexes of metalworking equipment, designed for series and small-series output of the most important kinds of machinebuilding products.

GPS introduction leads to an increase in the productivity of labor 2.5 to 5-fold as compared to traditional equipment. The effectiveness and repayment of costs for their creation and introduction is due to a considerable increase in the loading of the technological equipment the lengthening of

of its working cycle, reducing the machine tool park and correspondingly the production areas, and raising the shift coefficient of operation.

GPS make it possible to readjust production rapidly for the output of new kinds of products without additional capital investments and the replacement of the existing machine park.

According to calculations by specialists, the working cycle on universal metal-cutting equipment, performing in an individual mode, is 10 to 15 percent of the total time. The remaining time is taken up by preparatory-final operations. The GPS makes it possible to increase the working cycle to 70-80 percent and provide equipment functioning in the automatic mode with minimum human participation during at least one shift.

In 1984, there were 189 GPS (outside the USSR), including 60 in Japan, 38 in the United States, 26 in the FRG, 14 in Italy, 12 in the GDR, 9 in England, 9 in ChSSR, 4 in the NRB, 3 in the VNR, 3 in Sweden, 2 in the PNR, 2 in France, 2 in Switzerland, 2 in Finland, 1 in Belgium and 1 in Norway. The Soviet Union has 59 experimental-demonstration automatic sections and 15 shops.

During the 40th meeting of the CEMA, a general agreement was signed in the area of flexible production systems which specifies the organization of their specialized and cooperative production, and the introduction of various kinds of technologies, including flexible production modules, technological equipment, modular industrial robots, automated transportation-warehousing systems, electrical equipment, controlled computer complexes and systems for automatic design (SAPR), as well as program, and technical-norm software.

The introduction of the GPS facilitates raising the quality of the output, further improvement in organization and discipline in production, and clear-cut and smooth operation of all services of the enterprises and related industries.

The implementation of the general agreement will require the preparation and the signing, in 1985-1986, of a number of contracts and agreements on scientific technological collaboration, specialization and cooperation between planning-design organizations of CEMA members. It also becomes necessary to create combined design bureaus for the development of GPS components.

CEMA cooperation is also being developed in such priority directions as the creation of modern machines, equipment and their systems and complexes that reduce the use of manual labor; for strip mining, building pipeline mains that provide rational utilization and economic consumption of fuel and energy by using leading technological processes; comprehensive mechanization of agriculture and reprocessing agricultural raw food materials, etc.

In analyzing the summaries of CEMA cooperation along the priority directions, it is necessary to point out new trends in their development. As is well-known, in machinebuilding for many years, it consisted basically of mutual

supplies of products traditionally produced in the countries. As a result the share of new equipment in the goods turnover was relatively small.

Recently and, particularly, in the current five-year plan period, on the initiative of the Soviet Union collaboration, the following has been organized on the comprehensive principle: science-production-supplies. Because of this, the object of specialization in scientific and production activity becomes new progressive equipment on the level of the best in the world. This positive trend should be developed in every possible way.

Another important feature of the modern stage of collaboration is a change-over from developing individual types of machines and equipment to the promising system of standard machines, units and parts for the comprehensive solution of large sector and intersector problems. They use microprocessor, electronics robot equipment and flexible productions more and more widely.

One essential shortcoming of the present practice is the simultaneous large reserve which must be put in operation as rapidly as possible and still have a low volume of production manufactured cooperatively.

It is sufficient to say that of the 74 many-sided agreements (contracts) on specialization and cooperation of production, only 33 specify deliveries of complementing machines. The largest is an agreement on MSKP [expansion unknown] of automobile machines, units and parts of 23 November 1976 in which the NRB, VNR, GDR, PNR, USSR, ChSSR and SFRYu participate.

According to the agreement on MSKP for hydraulic equipment deliveries between USSR, CEMA and SFRYu of 280 kinds of products were made from 12 March 1976. According to the contract on cooperation for manufacturing walking and rotary excavators, the GDR, PNR, ChSSR and SFRYu send up to 170,000 parts and units to the USSR.

Providing newly created productions with complementing products is also called for by agreements signed in recent years: for computers, metal-cutting machine tools (including NC), automatic lines, special, heavy and special design machine tools, industrial robots, microprocessors and a number of other kinds of modern high productivity equipment.

At present, a contract is being prepared for signature on cooperation between the GDR and the USSR for the manufacture of 110 to 180-ton dump trucks. This contract specifies the export of heat exchangers and radiator coolers, steering drive components, etc. to the USSR.

As a result, in 1985, the turnover volume of parts and units on cooperation will be 16 percent as against 13 percent in 1984 in the total volume of specialized machinebuilding products.

The timely solution of matured problems is of great importance for the development of cooperation within the CEMA framework. At consultations on the coordination of national economic plans for 1986-1990, the countries

exhibited great interest in cooperation development in the area of microelectronics, industrial robots, flexible modules and systems, machining centers, high-tonnage trucks, heavy equipment and other progressive equipment. However, until now not one country has introduced specific proposals on organizing cooperative production. At the same time, as shown in practice, these problems can be best solved precisely by coordinating plans because this makes it possible to provide resources beforehand for the planned measures.

Another problem that must be solved (the sooner, the better) is to aim cooperative production at the acceleration of the scientific technological progress, at the mastering of the latest achievements of science and technology and the output of new generations of machines and equipment. Today, as a rule, it specifies the delivery of units and parts for products that have already been in production for a long time.

An important factor in the development of cooperation is price setting. Yet orientation toward world prices, adopted by the CEMA organs, does not stimulate deepening cooperation. Therefore, it is necessary to utilize the experience in the production of equipment for nuclear electrical power plants and computers, which indicates that these problems can be fully solved when countries coordinate a single price list for finished products, as well as for complementing products. A positive example is the cooperation on the "Lada" automobile where prices of units and parts are determined on the basis of their share of the cost or labor-intensiveness of a finished machine.

The development of cooperation is also retarded by a large number of unsolved problems in the typicalization and standardization of machines and equipment, especially, units and parts.

The expansion of direct ties between large enterprises and production associations of the fraternal countries is of growing importance in developing cooperation. As pointed out at the economic conference at the highest level, the problem is to implement measures for giving them the necessary authority and to create proper conditions for deepening cooperation.

An important factor in developing cooperation in the machinebuilding area is an improvement in contract relationships and organizational forms. Much work is being done recently in this direction within the CEMA framework. Besides traditional agreements on scientific technological collaboration and specialization and cooperative production, signed at the level of economic and foreign trade organizations, in the current five-year plan period concluding general and intergovernment agreements have come into practice. They reflect the intentions and mutual obligations of countries on the solution of large multisector national economic problems. General agreements specify schedules for creating and mastering new equipment, and the organization of specialized and cooperative production. Among them are agreements in the area of industrial robots, microprocessors, a single standard base for electronic equipment products, special technological equipment and materials for electronics and flexible production systems signed by heads of CEMA governments.

These agreements are, on one side, of a comprehensive nature because they span all stages of cooperation from scientific research and development to output and delivery of the products. On the other hand, they represent an example of a systematic approach to solving large national economic problems, because they have in mind not only the creation of new equipment, but also its wide application, training personnel, software, etc.

At present, according to the decision of the 39th meeting of the CEMA, interdepartmental agreements are being prepared for all machinebuilding sectors for signature at the ministry level due to the necessity, first, of concentrating the basic directions of scientific technological and production cooperation in one document. This will make it possible to isolate the main problems and concentrate efforts and money on them and free oneself from secondary problems that have lost their urgency, distribute resources more precisely and organize better cooperation. Secondly, increase the responsibility of ministers and managers of the subsectors for the situations in their respective areas. These agreements, as well as the general ones, will be implemented by a system of economic contracts.

An improvement in its organizational structure made on the basis of decisions of the economic conference at the highest level will play a great role in the expansion and deepening of collaboration in machinebuilding.

Based on these decisions suggested by the USSR at the 39th meeting of the council, the conversion was authenticated of the Permanent Commission into a CEMA Committee on Collaboration in machinebuilding which operates on the level of deputies of CEMA government heads. Its basic problem, as noted in the regulation for the committee, approved at the 114th meeting of the CEMA Executive Committee, is the comprehensive consideration and solution of the most important problems of the multisided collaboration related to providing key sectors of the national economies of fraternal countries with machines, equipment and devices of high quality and world technical standard, as well as developing the export potential and strengthening the technical economic invulnerability of CEMA.

The committee approved the work plan for the next two years and defined the most important problems of the area of scientific technological cooperation which must be solved.

In a short time, the committee prepared and the 40th meeting of the council approved, a general agreement on collaboration in the area of flexible production systems and an agreement on the use of compressed gas as motor fuel for transport facilities, defined areas of cooperation in creating progressive energy-saving equipment, special heavy machine tools, road machinery, machines for the comprehensive mechanization of agriculture, construction and chemistry, modern planes and helicopters for civil aviation, etc.

The implementation of these measures, outlined in the area of machinebuilding at the highest level by the following meetings of the CEMA, the accelerated uplift of the rates of the national economy in fraternal countries, the provision of the successful implementation of social programs and will play

an important role in solving strategic problems at the modern stage -- the changeover of economics to the intensive path of development.

Overview by Chairman A. Antonov

Moscow EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV in Russian No 8, Aug 85, pp 6-7

[Article by Aleksey Antonov, Deputy Chairman of the USSR Council of Ministers, Chairman of CEMA Committee on Collaboration in Machinebuilding: "Goal is Raising Intensification."]

[Text] The regular 40th meetinf of CEMA Council at the heads of government level was held 25 to 27 June 1985 in Warsaw, capital of the Polish Peoples Republic. The meeting reviewed the activity of the CEMA since the 39th meeting, the progress of coordination of the national economic plans and capital investments as agreed in the coordinated areas and objectives for 1986-1990, the coordination programs on economy and the efficient utilization of material resources in the period up to 2000. Materials of the meeting will be published in No 10 of the journal.

Machinebuilding is the most dynamic sector of the national economy of the CEMA countries. During 1950-1985, the output of machines and equipment in these countries increased about 35-fold for a 13-fold increase in industrial output volume as a whole. At present, cooperative socialist states produce up to 25 percent of the world production of machines and equipment. Fraternal countries occupy leading positions in the world in many kinds of the newest equipment.

The changeover of their economics to intensive development presents qualitatively new requirements to machinebuilding. To accelerate this process the sector is called upon to manufacture new generations of machines, equipment and devices for introducing progressive technologies, raising productivity of labor and reducing labor-intensiveness of production. Here, the greatest attention should be given to improving machinebuilding, developing computers, building instruments, electrical equipment, electronics, and improving other machinebuilding sectors which determine scientific technological progress.

The transformation of the machinebuilding structure in favor of sectors that are carriers of scientific technological progress and that provide considerable savings in energy, raw materials and other materials, can best be achieved by the active collaboration of CEMA countries. The basis of these changes must be an increase in the technical standard and quality of mutually supplied products.

The course on the intensification of collaboration of CEMA countries in machinebuilding was determined by decisions of the economic conference at the highest level. The conference decided that it should be of a comprehensive nature and be aimed mainly at providing key production facilities machines, and equipment of high quality and on the world technical level. This strategic approach to the development of modern equipment and technology

specifies collaboration over the entire cycle: from scientific research and design developments for the creation of new products to the organization of their specialized and cooperative production, and mutual supplies of constantly greater importance is the changeover from developing individual types of machines and equipment to creating systems based on standard machine assemblies, units and parts for comprehensive solutions of industrial and interindustrial problems.

To solve the most important problems posed by the economic conference, the 39th meeting of CEMA adopted the decision to form a CEMA Committee on Collaboration in Machinebuilding. It is called upon to expedite the more efficient formation of machinebuilding complexes in each of the fraternal countries, and cooperation as a whole, and to accelerate the introduction in production of the latest achievements of scientific technological progress.

In April 1985, a regulation of the committee and its permanent working organs was coordinated at a meeting of the committee which was approved at the 114th meeting of the CEMA Executive Committee. As the most important goal it specifies the solution of problems of multisided cooperation in machinebuilding related to the modernization of basic sectors of the national economy, the introduction of modern technologies and the development of the export potential of CEMA countries.

The committe also concurred on a general agreement on multisided collaboration in developing and organizing production (on a cooperative basis) of flexible production systems for machinebuilding. It was signed by delegation heads at the 40th meeting of the CEMA. The implementation of the agreement will ensure the wide introduction in the national economy of flexible technologies that facilitate a considerable increase in the productivity of labor, a reduction in the quantity of technological equipment and an increase in its utilization coefficient, a reduction in service personnel and production surfaces, an accelerated turnover in working capital, an increase in the quality of products and a reduction in the consumption of fuel and raw and other materials.

It is very important to define the direction of priorities of collaboration in creating progressive, resource-saving technologies and organizing specialized production of self-propelled mining equipment for underground work, special purpose heavy machine tools, road machinery, equipment for mechanizing agriculture and wasteless reprocessing of raw food materials, machines and equipment for the construction and chemical industries, and planes and helicopters for civil aviation and other equipment.

Measures are being implemented on organizing the cooperative production of a number of machines, equipment and devices whose sale is being limited by some western governments. CEMA countries have all that is necessary to strengthen their technical economic invulnerability by their collective efforts.

Permanent working organs (committee bureaus and sector bureaus) created by the Committee are fully authorized to finally coordinate questions in their jurisdiction for the most efficient implementation of problems entrusted to them. Within the frameworks of these organs it is planned to sign over 50 protocols in 1985 to extend to the following five-year plan periods additions and clarifications of active agreements on specialization and cooperative output of machinebuilding products. The protocols specify an increase in the concentration of production, an increase in exports of products and an improvement in their characteristics.

Special attention is being given today to intensifying cooperation in production. The development of units and parts specialization is directed toward the wide involvement of the countries in the international socialist division of labor in manufacturing and the mutual supply of complementing machines and units. In this connection, according to the decision of the economic conference, measures are being developed to expand and improve direct communications between the associations, enterprises and organizations of fraternal countries.

In connection with the comprehensive program being prepared for scientific technological progress and long-term mutual collaboration programs within the framework of the committee, the development has begun of promising programs to develop manysided specialization and cooperative production of a selected product list of machinebuilding products for a period of up to 2000.

The committee must do major work on improving the structure and reequipment of machinebuilding, the efficient utilization of production capacities, creating and mastering the newest equipment and resource-saving technologies as well as solving other general machinebuilding, interindustrial and intra-industrial problems.

The implementation of the measures outlined by the committee will facilitate the accelerated intensification of the national economy in fraternal countries, strengthening their production and scientific technological potential and strengthening socialist collaboration in the world's economy.

Special Relationship with Bulgaria

Moscow EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV in Russian No 8, Aug 85, pp 8-11

[Article by Ognyan Doynov, Politburo member, secretary of PKP Central Committee, Minister of Machinebuilding]

[Text] The conference of the secretaries of the Central Committees of communist and workers parties of CEMA members on economic problems held in May 1985 in Moscow stated that the gradual bringing to life of the decisions of the Economic Conference at the highest level is an important element in the further progressive development of socialist collaboration countries which will strengthen their harmony and unity. In implementing the agreements reached at the Economic Conference, the fraternal countries are placing at the head of their activities the acceleration of scientific technological progress, the introduction in production of the newest

achievements of science and technology, and the equipment of key industrial sectors with high productivity machines and equipment. In the constant and rapid renovation of existing production facilities, the achievement of qualitative progress in their structure and technical level, special attention is given to machinebuilding, intensifying and expanding, in this leading sector, multisided and two-sided specialization and cooperation and, on this basis -- create and manufacture machines and equipment of high quality and on a world technical level. The CEMA Committee on Collaboration in Machinebuilding created in 1985, is called upon to play an important role in this. In this connection, the Chief Editor's Office requested O. Doynov, member of the Politburo, secretary of BKP Central Committee and Minister of Machinebuilding; L. Maroti, member of the Politburo of the VSRP Central Committee, Deputy Chairman of the VNR Council of Ministers; G. Klayber, member of the Politburo of the SEPG Central Committee, Deputy Chairman of the GDR Council of Ministers, Minister of General, Agricultural Machinebuilding and Automobile Building; Z. Shalayde, Deputy Chairman of the PNR Council of Ministers; G. B. Stroganov, Deputy Chairman of the USSR Gosplan; and I. Vorachek, First Deputy Chairman of ChSSR Gosplan, to tell how machinebuilding is in their countries at present and in what directions is collaboration becoming more intensive and expanding between CEMA countries, as well as what are the immediate prospects on collaboration and how, in their opinion, the formation of the CEMA Committee on Collaboration in the Area of Machinebuilding would contribute to the intensification of production and the scientific technological ties between the fraternal countries.

The creation of a material equipment base for an adequate mature socialism for the purpose of a constant increase in the welfare of the people is our main problem. Its solution is possible only by the accelerated introduction of the newest achievements of scientific technological progress. Such are the determining landmarks of the directions of priorities in the development of our machinebuilding.

Bulgarian progress is neither possible nor separable from the dynamic processes of socialist economical integration. Therefore, we associate the problem of the direction of priorities entirely to the specialization of NRB within the CEMA framework.

The fight to increase machinebuilding products is aimed at strengthening the authority of socialist collaboration -- the nucleus of socialist progress in the world.

Considerable successes were achieved in recent years in the scientific technological and economic development of the sector. The thrust is on new technologies, their automation, accelerated development of the production of high productivity machines and their systems, technological lines, mechanical manipulators and robots. The share of new and improved products in the total volume of commercial goods in the current year will reach 22 percent.

At present, the efforts of our people are directed toward solving problems posed by the 12th party congress for the 8th Five-Year Plan period. It can be stated with full confidence that the plan goals for the year before the congress will be overfulfilled for all basic indicators of the industry. The output of products will increase more than 1.6-fold, while the productivity of social labor will increase more than 1.7-fold on the average.

The production has been successfully mastered in the country of memory storage magnetic disks and tapes, small and large computers, microprocessors and other electronic equipment. A modern microelectronic base is being created. Production of NC, control systems for large chemical installations at power, metallurgical enterprises and a number of others has been mastered.

Considerable production and technical experience has been accumulated in manufacturing automation facilities and systems. In accordance with international specialization Bulgaria manufactures materials handling machinebuilding, shipbuilding, warehouse equipment, communications facilities, and machines and technological lines for the food industry. We are mastering the production of flexible automatic production systems (GAPS) and are accelerating their introduction. Special attention is being given to the use of robots and robot equipment, programing, pneumatic and hydraulic devices, biotechnologies and bioequipment.

Small and medium-size enterprises are being created rapidly in our country. They will be expanded and improved. This will make it possible for us to achieve the necessary interrelationship between large scale enterprises and flexible, maneuverable small and medium-size enterprises which, in the final result, as we expect, will accelerate the introduction of the best achievements of scientific technological progress in production.

In other words, as a result of step-by-step implementation of the party's policy, the special attention given by the BKP Central Committee and Comrade Todor Zhivkov, machinebuilding has been established as a dynamic, structure-determining and export sector which is developing at high and advanced rates as compared to other economic sectors.

Machinebuilding is called upon to reequip all sectors of the national economy with high productivity automatic machines, automatic lines and modern high quality competitive machine systems. These are the basic plan goals posed by the party and government for machinebuilding.

We strive to maintain high and stable rates in the development of machinebuilding (10 to 12 percent) by increasing the share of renovated products constantly.

The obtained results are a good basis for the further economic growth of machinebuilding, but our satisfaction in the work we see is not in what we obtained yesterday, but in the effort to achieve still more today and tomorrow.

A soceity of developed socialism is an open dynamic system which, in the process of evolution, puts forward all new problems that are responsive to the rules of that development. The Plenum of the BKP Central Committee held in February of this year posed many responsible problems. It was stressed especially that machinebuilding is called upon to incorporate, as soon as possible, the achievements of science and technology in high efficiency and reliable machines, devices and technological equipment. It was also pointed out that machinebuilding and technical progress are organically interconnected. At present, multisided large-scale work is being carried out in the country on preparing long-range plans for the comprehensive development of the sector for the following years.

By taking new requirements into account, machinebuilding in 1986-1990 will develop at advanced and stable rates, with its role as the carrier of scientific technological progress increasing. The structure of improvement in the sector and the renovation of its product list will be continued. The following subsectors and productions will be given prior development: automation on the basis of computers, electronic, hydraulic and pneumatic complementing components and units, robots, programing and automatic technological production systems, and biomachinebuilding products. The share of the sector in creating complete sets of technological lines, installations and plants will increase.

According to this, the investment policy in the NRB is being devoted fully to the requirement of increasing the intensification of production and the effectiveness of capital investments. It is planned to improve indicators of machinebuilding further. About 4000 new products, 1400 technologies and over 1000 automatic production and control systems will be introduced. The average annual share of renovated products must be 20 percent of their total output.

A wide program is being prepared to improve research, experimental and introductory activity in the sector so that a qualitatively new level can be achieved.

Constant improvement of the social control system according to the dynamic development of the socialist society is a direct problem of the BKP Central Committee. Our party wll make an important contribution to the development and enrichment of the Marxist-Leninist theory and practice of social control under the conditions of the Peoples Republic of Bulgaria.

In practical activity we make wide use of a comprehensive-systematic approach as a lever for improving the control of the machinebuilding section. It consists of unity of goals, problems, means and final results. The scales and aspects of its application in social practice are different.

Of special importance is the strategy of selection in science and technical progress, including machinebuilding. Based on real possibilities in the

country, taking into account our participation in socialistic economic integration and the huge Soviet scientific technological production potential, we are concentrating our forces and means on the development of certain modern directions in industry.

The following important moment is our application of the so-called multiplication approach (it represents a further development of the program-target and comprehensive approach), in which the technological and object specialization is implemented by taking into account not only individual enterprise, an economic organization or department, but also the entire national economic complex, with optimal standardization and typicalization of production. This will achieve the necessary proportionality between production capacities in individual sectors and subsectors.

After that, the comprehensive approach requires the consolidation of more and more work operations, as well as of individual technologies into a single process. This forms so-called integrated technologies which are a characteristic features of modern industrial development. Their use creates great new possibilities. Independently of the form of their modernization, automatic technological modules and GAPS in machinebuilding or automatic continuous processes in other sectors, they produce a single final result: higher efficiency of production.

The programed organization of scientific and technological progress is of great importance in the comprehensive approach. The changeover to the creation of programed scientific collectives, whose activity is based on utilizing economic principles and levers is proceeding on a wide front.

An important part of the program - the target approach to machinebuilding is the development and introduction of comprehensive programs. Target programs for the development of the sector are automation, electronization, robotization, GAPS, biomachinebuilding and heavy machinebuilding.

The basic direction and the distinguishing feature of the economic and scientific technological policy of the Bulgarian Communist Party are a course on the constant expansion and intensification of economic and scientific technological collaboration and integration with CEMA countries, especially the Soviet Union. "...For us," stressed Comrade Todor Zhivkov, "socialist integration is of vital importance because it frees us fom obstacles placed before us by a small territory and small population, and opens for Bulgaria a wide path for the development of a scientific technological revolution."

Accumulated experience confirms the correctness of the course taken. Soviet science, the economic production and the scientific technological might of the USSR are strong bases for the progress of the Bulgarian economy, including machinebuilding. Development successes of such subsectors and productions as the output of electric cars, warehouse equipment and intraplant transport facilities; computer equipment and, especially, peripheral devices; communications facilities; hydraulic and pneumatic devices; metal-cutting machine tools; a number of machines and equipment for agriculture; power; metallurgy; construction materials, as well as shipbuilding, chemistry and others in which our country specializes, are shining proof of the fruitful effect of economic socialist integration.

As a result of close scientific technologies collaboration and direct contact with Soviet organizations, as well as because of the help they extended to us, the level of research, introduction and production activities in the sector increased.

The real expression of the active participation of Bulgarian machinebuilding in the international division of labor and socialist economic integration, is the constant growth of the share of its production in the total exports of the country. At present, it exceeds 50 percent.

Special attention is being given to the expansion of the direct ties and the economic and all-sided drawing together with the USSR. In the following five-year plan period, the NRB will participate in over 100 multisided contracts on specialization in machinebuilding. In over 60 contracts, this sector of Bulgaria will be involved as a producer in about 1500 specialized positions.

It is planned to changeover to new, more progressive forms of integration. For example, our government is interested in the cooperative creation of capacities, for manufacturing specialized products for the production of storage batteries, mini-hydraulics, heavy machine tool building, etc. It is also advisable to create, with CEMA countries, joint long-term links for experimental, plan-coordination and commercial sales activities, with the basic thrust on the leading subsectors of scientific technological progress.

As is well known, the economic conference at the highest level of the CEMA countries in Moscow posed for machinebuilding new, still more responsible problems, related to bettering the welfare of workers and strengthening the might, unity and solidarity of socialist collaboration. Collaboration in machinebuilding must be given a comprehensive character in order to provide the most important sectors of the national economy with machines and equipment of high quality and of world technical standard. In this connection, we greet the creation of the CEMA Committee on Collaboration in the Area of Machinebuilding and see it as an important lever for breathing life into the plans of the Moscow conference. We are convinced that the committee, as a new and progressive form of cooperation, will help to realize to a considerable degree the ideas of Comrade M. S. Gorbachev, given at the March Plenum of the CPSU Central Committee: "We will do everything we can to expand collaboration with the socialist governments to increase the role and effect of socialism in world's affairs."

The BKP Central Committee expresses its firm confidence that the committee will raise collaboration in this area to qualitatively new heights, and considers that basic attention should be given to agreement of the economic and scientific technological policies of the countries, the coordination of national economic plans and long-range planning, an increase in the efficiency of production and scientific technological ties within the CEMA framework.

Hungary's Export Ratio

Moscow EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV in Russian
No 8, Aug 85, pp 11-14

[Article by Laslo Maroti, member of Politburo of VSRP Central Committee, Deputy Chairman of the VNR Council of Ministers: "Machinebuilding in the VNR at the Modern Stage."]

[Text] After Hungary was freed from fascism, machinebuilding became of great importance. Basic directions for its development under economic planning conditions were determined by the main goals of our economic policy which took into account the economic and technical possibilities of the country, as well as requirements dictated by external economic ties.

In the first postwar years, machinebuilding played a decisive role in the restoration of the country, while in the following period, it was involved in the dynamic development of the national economy in the production of products to meet people's requirements and create bases for collaboration with CEMA countries.

Taking into account the necessity of the intensive participation of the country in the international division of labor caused by scientific technological progress, our economic policy has now assigned an important place to machinebuilding.

The dynamic development of machinebuilding in the industrialization period not only facilitated, to a considerable extent, the saturation of all sectors of the national economy with machines and equipment, but also facilitated the implementation of central programs in the wide-scale modernization of large industrial enterprises and improvement in the structure of the national economy.

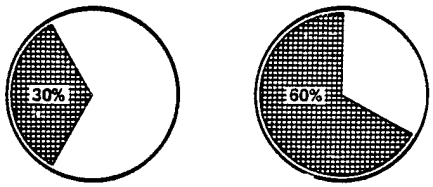
In 1970, the machinebuilding output was greater than 5-fold that of 1950. However, in the seventies, because of unfavorable changes in the world's economy, development rates of Hungarian machinebuilding slowed down. During the last 15 years, because of cooperation with CEMA countries, there was a slow but constant increase in machinebuilding without essential jumps. There is no doubt that, starting in the second half of the seventies, we succeeded with help from fraternal countries in renovating the internal structure of machinebuilding and a prevailing part of exported products.

At present, machinebuilding output is 30 percent of all Hungarian manufacturing production. However, the role of this sector in the external economic ties is still more significant, because in export deliveries of industrial goods to the socialist countries its output reaches about 60 percent.

The development of individual machinebuilding subsectors can be characterized in the following manner. As a result of implementing government decisions, and active VNR participation in the international socialist division of labor in the production of transportation facilities, there was a rapid increase in the output of buses and their basic units. At the same time, the product structure in this sector changed significantly: production was concentrated on manufacturing individual types of RR transport and shipbuilding, while the

output of trucks and tractors of low and medium capacities, dump trucks and complementing units for them, according to multisided and two-sided agreements on specialization, was discontinued.

Machinebuilding in the VNR



Share in industrial production

Share in export of manufactured goods to socialist countries

Since 1962, after the VSRP Central Committee adopted a resolution to develop machinebuilding, systematic modernization of the sector's structure has been continued. At the start of the eighties about 40 percent of the output was modern NC machine tools controlled by computers. Their share in the total export of machine tools to socialist countries also reached about 40 percent.

In 1979, our country joined the CEMA countries in multisided specialization in the production of equipment for nculear power. Domestic machinebuilding mastered and organized the production of special water-purifying installations for the primary loop of the AES, reloading machines and other equipment for repairing and technical servicing of the AES.

In the second half of the seventies, the introduction of industrial production systems in development of agricultural and food machinebuilding required special attention. Considerable efforts were applied to organizing the production of individual kinds of high productivity machines and equipment which would meet world standards. Power machinebuilding was developed and improved on the basis of purchased licenses and "know-how."

To satisfy people's requirements, the output of long lasting consumer goods such as refrigerators, washing machines, TVs, etc. was increased.

On the basis of the requirements, especially of the Soviet market, there was considerable expansion in the production of equipment and technological lines for the cable industry, various painting lines, roller-contact bearings, machines and equipment for the chemical industry, cables, conductors, etc.

Traditionally, the Hungarian manufacturing system included instrument building, radio equipment and electronics which are organic parts of machinebuilding. The advanced development rates of these sectors was the cause of a considerable increase in their share in the total volume of machinebuilding output and export to fraternal countries.

Conditions for developing these sectors were created primarily by the active participation in the division of labor within the CEMA frameworks. In this connection, on the basis of the national central development program, a sector was formed for the production of computers, whose products find a constantly greater application. Production was organized and the assortment expanded of various means and communications systems, automatic and telemechanical components and systems for gas and petroleum lines, medical equipment products, etc. The base of such a modern sector as a unified electronic industry is also being strengthened. The basic customers for these modern products are CEMA countries in accordance with manysided and two-sided agreements on specialization.

In July 1983, the VSRP Central Committee adopted a resolution in which requirements and basic directions for the long-range development of industry were formulated. The priority problem for machinebuilding was defined as developing and introducing electronics widely, especially microelectronics whose most important components for 1986-1990 are:

wider utilization of microelectronics in individual products and as a result of this, the appearance of new kinds of products and an increase in the contribution of machinebuilding to the modernization and automation of reprocessing sectors of industry;

modernization of machinebuilding production with wide use of automation on the basis of electronics.

The implementation of this program is a radical increase in the standard of production in machinebuilding and all manufacturing. Therefore, special attention is being given to the output of computer controlled NC machine tools, robot equipment and its introduction, as well as the creation and wide use of flexible production systems and modules -- the most progressive technologies. Mastering and introducing widely biotechnology facilitates, to a great degree, the reequipment of the national economy. Therefore, the problem of machinebuilding is to create and produce the necessary machines and equipment for that.

The natural conditions of Hungary are such that it is very important for us to solve power problems, the creation of energy saving machines and equipment, and their introduction into production in the shortest possible time.

In posing for ourselves new problems in the development of domestic machinebuilding, we naturally would like to maintain positions already achieved. The improvement of all kinds of machinebuilding products are distinguished by high technical standards, competitiveness and progressive production technologies. There is a demand for such products in the CEMA countries and their sale is assured by the stable international socialist division of labor, as well as by mutually beneficial commercial ties.

We consider individual automobile products (buses, front and rear axles, complementing parts and units for the production of passenger cars) such products: certain types of equipment necessary for reprocessing agricultural products (silos for storing grain, transportation devices, equipment for flour grinding, the canning and cheese-making industries, and meat-packing plants).

In the past, the main emphasis on finished products in individual areas slowed down development and modernization, as well as the creation of capacities for the production of complementing parts and units which are the "backup" of modern machinebuilding.

It has now become more acutely necessary to intensify the production of semifinished electronic and mechanical units and parts. For this purpose, we along with our own efforts are counting on accelerated rates of collaboration between CEMA countries.

The following measures are proposed to realize the problems faced by machinebuilding:

increase in the level of automation, especially in the area of technological process control using microprocessors and computers and introducing robot equipment;

introducing electronics in mechanical processes and create mechanotronics more efficiently;

develop precision machining methods and using them on a larger scale;

reduce the weight of products, spread the use of material and energy-saving technologies, increase reliability of coperation.

We are sure that sequential implementation of the outlined course of machinebuilding development will be a worthy contribution to the successful achievement of the technical progress planned by the CEMA countries up to the year 2000.

At present, the VNR participates in more than 90 multisided agreements on specializing production in machinebuilding. Hungarian enterprises are meeting their obligations to manufacture about 2000 kinds of specialized products.

Fifty percent of the Hungarian machinebuilding products are exported; of these 2/3 are sold in socialist countries. The fairly high level of international socialist division of labor is shown by the fact that 45 percent of the machinebuilding output is made up of specialized products supplied to socialist countries.

In individual machinebuilding sectors, it is possible to achieve a still higher level of the division of labor. Thus, 87 percent of the buses, 67 percent of the machines and equipment for the food industry, 54 percent of the metal-cutting machine tools and 61 percent of the equipment for the chemical industry are produced on orders by socialist countries.

At the same time, as a result of the division of labor, Hungary stopped the production of such formerly produced products as medium power tractors, trucks, RR freight cars and others, while socialist countries supply Hungary with mining and metallurgical equipment, machines for construction and the construction materials industry, polygraphic equipment, a large part of the equipment for the chemical and oil-refining industry, trucks and passenger cars, etc. The production of individual kinds of parts is not organized.

In the seventies, cooperation developed in individual groups of machinebuilding products; in the production of complementing parts and units, primarily for automobile transportation. Passenger cars are not manufactured in Hungary. At the same time, we manufacture complementing parts and units for building automobiles in other socialist countries. Good results were also obtained in production cooperation on the main units of buses and trucks, for example, front and rear axles.

However, in spite of these successes, we should not be satisfied with the achieved production cooperation level for complementing units and parts. In our opinion, in the organization of large series production, large reserves of various mechanical, hydraulic, pneumatic, electrical and electronic "modular" components are hidden at specialized plants.

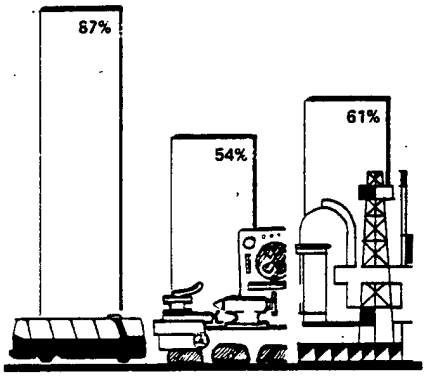
At the highest level of the economic conference held in 1984, problems were outlined for the year 2000, with special attention being given to the development of machinebuilding, the acceleration of technical progress as a whole and an as wide as possible introduction of electronics and automatic systems.

In the international relations of the VNR, cooperation with CEMA countries and active participation in socialist economic integration plays a decisive role. Hungarian machinebuilding also considers the main guarantee of successful development of the future intensification of integration with countries of socialist collaboration. We will strive to make a contribution to the achievement of the common goals outlined in the economic conference of the CEMA countries at the highest level, and will do everything possible to collaborate in the successful fulfillment of problems of economic development of each member country of the CEMA.

The permanent CEMA Commission on Cooperation in the Area of Machinebuilding, created in 1956, facilitated the achievement of considerable successes in the sector. Much work has been done on organizing the division of labor between socialist countries so that in the past three decades CEMA countries were able to meet basically the requirements of socialist collaboration in machines and equipment.

We think that the new organ -- the CEMA Committee on Collaboration in the Area of Machinebuilding, created on the level of respective Deputy Chairman of the Councils of Ministers of our country, will be able to work still more fruitfully. The committee is a forum in which, taking into account the national economic interests of the CEMA countries, systematic consultations will be held on questions concerning machinebuilding as a whole, as well as the machinebuilding aspects of other sectors of the national economics of our countries.

Share of output of indiyidual machinebuilding products ordered by socialist countries



Buses | Metal-cutting machine tools | Equipment for chemical industry

In the course of the committee's work, it will be possible to adopt coordinated solutions to determine solutions on cooperation in scientific research and technical developments; on joint capital investments necessary for solving large-scale common problems on the modernization and technological reequipment of machinebuilding; on organizing international specialization and cooperation of production, give special attention to large series production within the framework of cooperation on various units and parts; on the elimination of existing parallelism in the output of individual kinds of products.

In the coming period, the basic strategic problem of developing the economics of the CEMA countries is the acceleration of the changeover in the efficiency of production; provision of internal and external economic equilibrium and strengthening the external economic positions of our countries. We face a problem to find a possible collective solution of basic economic problems of common interest.

A comprehensive approach to the solutions should be given a very important place in the committee's work. Great importance must be given to comprehensive automation by using electronics. No less important is to reduce the weight of machines and equipment and to provide design and technological conditions for their energy saving operation. Here sectors that manufacture modern materials play a decisive role. The committee, on one hand, must inform the electronic industry and the sectors that manufacture modern materials about quality requirements and thereby facilitate the development in these areas and at the same time, provide these sectors with authentic data on the average and long-term qualitative requirements of machinebuilding. On the other hand, machinbuilding and the committee must supply related industries with modern, high productivity machine tools, equipment and devices without which the given problems cannot be solved.

The guidance and the effect on the progress of these complicated interrelated and intercomplementing processes will be the problem of the new committee. Working organs guided by the committee must independently and with a great deal of initiative implement the work entrusted to them. Their problem is to organize the specialized and cooperative production of products of high technical standard and competitive complementing units and parts, to train and organize scientific technological collaboration, standardization and typicalization of products.

Hungarian machinebuilding always did everything it could to participate actively in manysided collaboration and will also in the future.

The Hungarian Peoples Republic will do everything possible so that the work of the committee is carried out in accordance with the requirements established by the highest level of the economic conference, to meet goals set for the year up to 2000 successfully.

GDR's Advanced Production Technology

Moscow EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV in Russian
No 8, Aug 85, pp 15-18

[Article by Gunter Kleiber, member Politburo of SYePG Central Committee, Deputy Chairman of the Council of Ministers of GDR, Minister of General, Agricultural Machinebuilding and Automobile Building: "Decisive Factor of Acceleration and Intensification"]

[Text] The economic strategy of the GDR is directed toward the continuation of the course taken by the party and the government on solving the main problem in the unification of economic and social policy. In bringing it to life, workers of our republic are achieving great feats. This is shown by the fulfillment of the obligations adopted to celebrate the 40th Anniversary of the victory over Hilter's fascism and freeing the German people, and the socialist competition in honor of the coming 11th Congress of the SYePG.

The GDR is taking the path of further constructing a developed socialist society in fraternal collaboration with the Soviet Union and other CEMA countries. The expression of this are contracts between the GDR and the USSR on collaboration in the area of science, technology and production up to the year 2000, whose implementation opens up a new stage of economic and scientific technological collaboration between our governments.

Further expansion of relations between the GDR and the USSR in all areas for the welfare of our peoples was the subject of friendly talks between E. Honecker, General Secretary of the SYePG Central Committee and M. S. Gorbachev, General Secretary of CPSU Central Committee during a friendly visit on 4-5 May 1985 in the USSR.

A decisive factor in systematic economic development of the GDR is the intense acceleration of the changeover of the entire national economy. This is the only way to increase further long-range economic potential. Machinebuilding has an important role in this process.

Machinebuilding must facilitate greatly the achievement of scientific technological progress effectively and introduce at a high rate the reproduction process, and create premises for a continuous increase in labor productivity; this will require an annual renovation of 30 percent of the output assortment.

Machinebuilding is called upon to solve mainly the following problems.

First, to provide material resources for socialist improvement in production methods. Machinebuilding, as a producer of the means of labor and production tools carries great responsibility for this. By manufacturing high productivity machines, equipment and devices, as well as by modernizing machines and equipment which are still suitable for operation it creates the essential premises for using progressive methods and production technologies in all sectors of the national economy. Effective results in this must be achieved by the wide use of microelectronics and the introduction of flexible automation production processes.

Machines and equipment designed for all-around promotion of socialist efficiency in all sectors of the national economy can be utilized simultaneously:

to strengthen the power and raw materials base, including the utilization of production wastes, byproducts and secondary raw materials;

to expand and, in particular, to modernize the material-equipment base of all sectors;

to provide a higher degree of reprocessing power carriers, raw and other materials.

Secondly, raise the material and cultural standard of the people. Therefore, the volume of output of modern technical consumer goods will increase with new consumer properties by utilizing the entire machinebuilding potential. In solving this problem, we strive to improve the supply of kitchen and bathroom equipments to households; to meet housing requirements more fully; to provide goods for people for their cultural leisure and relaxation more fully.

Thirdly, provide for the proportional development of production of finished and complementing products, as well as spare parts. The improvement of consumer properties and the quality of complementing products and spare parts must meet all requirements for such products.

Fourth is the solution of external economic problems. Machinebuilding is a sector of the national economy of the GDR whose production is used to a significent degree for export. According to agreements on specialization and cooperation of production concluded with the Soviet Union and other CEMA countries, it must undertake large and constantly higher obligations within the frameworks of socialist economic integration. Special attention is given to exporting machines and equipment according to the USSR requirements. Here it is planned to increase scientific technological standards, efficiency and productivity of exported machinebuilding products.

Along with the traditional assortment of products, new kinds of machines and equipment of a high technical standard are being developed and introduced in production to meet the requirements of the external market. These are flexible automated production systems and sections, high efficiency equipment and devices for the food and textile industries, highly automated fishing, marine and coastline ships and other machines and equipment with automatic control based on microelectronics.

To meet the requirements of the national economy of machinebuilding in our country, it is necessary to increase further the productivity and efficiency of the production facilities in its sectors and subsectors.

It is planned to increase the productivity of labor by the use of modern technologies with a simultaneous reduction in the consumption of materials and energy per unit product. A higher degree of reprocessing raw and other materials is being achieved in the process of producing new or improved products. The existing park of machines and equipment is being utilized by introducing technological innovations, a further reduction in idle time and an increase in the shift coefficient. And, not least, the efficiency of the national economy is increased maximally by the judicious national and international division of labor.

Great efficiency in production processes in machinebuilding of the future will be achieved primarily by creating and introducing automated production sections. This includes the simultaneous automation of preparation for production, as well as automated control, planning and accounting.

The modernization of machines and equipment, primarily machine tools is of special importance. This requires corresponding units, especially those such as control devices, robot equipment, drives and measuring equipment.

Wide use of industrial robot equipment is one of the most important problems of our machinebuilding. It should be stressed that greater use of robots with high technological flexibility is envisioned, which will make it possible to free a large number of workers.

It is also necessary to further expand the use of microelectronics which is one of the basic technologies of our time. This applies to scientific technological parameters of machinebuilding products, as well as to the technological standard of the sector. Software also merits great attention. The successful solution of the posed problems assumes the use of modern forms of the organization of production.

Industrial combines of the GDR have all the necessary premises for the fulfillment of the posed problems. The responsibility for all decisive phases of the reproduction process is placed on the combines. They have all the necessary scientific technological and production potential for the most efficient output of products to staisfy the requirements of the national economy and for export. Combines are constantly solving problems of renovation of the product assortment and the introduction of modern technologies by efficient methods, including the introduction of flexible automatic production systems.

The successful development of our republic, its economy and, not least, of machinebuilding is inseparably tied to international economic and scientific technological collaboration, in particular, with the USSR and the other CEMA countries. The all-around expansion and intensification of collaboration have decisive importance for the further formation of a developed socialist society in the GDR. The concentration of efforts and the means of the participating countries contributes to saving time and achieving a great effect.

The constant growth of the national economy, the uninterrupted increase in the economic potential of the GDR -- this is graphically confirmed by the results of 1984 -- the fruit not only of great efforts by our republic, but also of collaboration with fraternal countries. The results of this collaboration are multisided. To a great extent, specialization and cooperation in production affected the concentration, and formation of specialized production facilities and the development of trade between our countries.

The trade involves the following: shipbuilding, rolling stock, open-pit and materials handling equipment, equipment for the metallurgical industry, agricultural machinebuilding, machine tool building -- a sector whose high quality products occupy a promising place in the export structure. Thus, GDR machinebuilding makes a considerable contribution to the requirements of the CEMA countries. It is primarily oriented toward the output of machines and equipment of a high scientific technological standard which can utilize effectively the use and intensive reprocessing of raw materials, as well as the application of energy saving production methods. This meets requirements of fraternal countries. Thus, for many years, the GDR has been supplying metallurgical equipment to the USSR. The 28 rolling mills, imported by the USSR from our country, produce 1/6 of all rolling stock in the Soviet Union. It imports over 30,000 refrigerator cars and over 3000 ships from the GDR; 40 percent of the agricultural equipment and 3/4 of the total volume of forge-press equipment are imported from the GDR by the USSR.

In its turn, the Soviet Union exports to the GDR such important machinebuilding products as power equipment, including equipment for nuclear electrical power plants, metallurgical equipment, drilling rigs, high productivity tools, high capacity trucks and passenger automobiles. The GDR traditionally imports from the NRB, floor type transportation facilities; from the VNR -- buses and recording tapes; from the PNR -- machines and equipment for the construction and woodworking industry, the SRR -- hydraulic cranes and freight cars, from the ChSSR -- power equipment, streetcars and machine tools.

A number of still other examples of collaboration results could be cited. Many problems are solved on its basis, but many still bigger ones will have to be resolved.

The realization of all-around intensification of the national economy, the application of flexible automation, expansion in the use of microelectronics, the development and introduction of new technologies and products, the solution of complicated and large external economic problems -- all this will

also, in the future, urgently require close collaboration of the GDR with other fraternal countries, as well as a flexible rapid and effective reaction to new demands of world scientific technological progress.

At the basis of the concept for developing our national economy, including machinebuilding as a strong foundation, are agreements made with the Soviet Union on collaborating in the areas of science, technology and production to the year 2000, collaboration contracts concluded with the other CEMA countries, as well as problems brought up by the economic conference of the CEMA countries at the highest level of the 39th meeting of the Council.

Special plans, approved by the government, defined questions of the practical purposeful realization of collaboration contracts. They include, in particular, the following:

organization of collaboration in the area of comprehensive automation of production, in particular, in the development and production of flexible automatic production systems, including equipment for automatic control systems for production and technological processes, automatic design systems, software and robot equipment;

intensification of cooperation in meeting requirements of CEMA countries for high productivity machines and equipment for fuel-raw materials complexes, the expansion and acceleration of mining and the efficient utilization of domestic kinds of raw materials and fuel, the use of secondary resources, as well as the economical use and consumption of energy and materials;

further collaboration on the comprehensive mechanization of production in agriculture and the food industry by further improvement in high productivity machine systems for the sowing, and highly efficient harvesting of crops, and reprocessing products of agriculture, animal husbandry and feed production;

collaboration in creating modern devices for medical equipment using microelectronics;

development and production of traditional GDR export machinebuilding products, for example, ships and RR rolling stock;

further development of collaboration in sectors that are important for manufacturing complementing products, for example, in the production of hydraulic products, diesel engines and the bearings industry;

measures on modernizing production capacities, in particular, within the framework of collaboration for implementing the Provision Program of the USSR;

collaboration in organizing the production of progressive machines and equipment, as well as technical modernization of enterprises for the production of consumer goods, and in expanding cooperation in the production of durable consumer goods.

The solution of the posed problems will make it possible to take further important steps on the way to all-around economic and scientific technological collaboration, and the interweaving of the national economies of our countries, which should facilitate intensified acceleration of production. The GDR will participate actively in this process.

The economic conference of the CEMA countries at the highest level aims toward mobilizing all possibilities for the full development of collaboration for the purpose of wide agreement to the dynamic and proportional development of their national economies. Among the most important problems at the modern stage are intensified production, the fullest utilization of scientific technological progress and the mobilization of all resources in the countries. Here is stressed the decisive role of machinebuilding, reflected in the resolution of the 39th meeting of the Council on creating the CEMA Committee on Collaboration in the Area of Machinebuilding. SEPG leaders and the GDR government hope that with the formation of the committee and by cooperation in machinebuilding, machines and equipment will be created and manufactured which will be as good as the best in the world. This is as essential premise for a high rate of increase in the productivity of labor in each country individually and socialist collaboration as a whole. It should be stressed that collaboration should be concentrated on such basic questions as providing for the economic and raw materials invulnerability of the socialist countries.

We attach special attention to the organization of collaboration by the committee in bringing to life large processes of renovation that occur in science and technology. Machinebuilding must make a significant contribution to the implementation of these processes. The most important problem faced by the committee is extensive all-around correlation between the development of electronics and the creation of most modern machines and equipment without which it will be impossible to solve the posed problems.

We consider very essential the committee's organized activity that would make possible flexible and fairly rapid reaction to the new originating requirements of scientific technological progress. The committee's style of work must be rational and effective.

We think that to solve problems posed before the committee, it is necessary to concentrate the activity of the country's representatives on selected and priority problems. Being competent representatives, they will determine the scope of the problems being solved by the committee, and carry full responsibility for it. No less responsible is the activity of the committee's working organs which adopt decisions on cooperation in sectors. The committee took the first steps in its work. In its second meeting, plans were approved for general agreement on flexible automatic production systems, and problems of collaboration in developing and manufacturing these production systems. The basic problems of the committee, its methods of operation and its organizational structure were defined.

Now it is necessary to prove by our work that the committee will be able to fulfill the task given by the party and government leaderships of our countries, and solve successfully the large problems faced by machinebuilding.

We are for collaboration within the framework of the general agreement on flexible automatic systems, for whose realization the committee is responsible and which will become an example of its effective and successful activity.

Gosplan Official on Technological Progress

Moscow EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV in Russian
No 8, Aug 85, pp 23-27

[Article by Genrikh Stroganov, Deputy Chairman of USSR Gosplan: "Most Important Factor of Scientific Technological Progress"]

[Text] As is well known, the main problem at the modern stage of socialist society in the USSR is the completion, in the early eighties, of the changeover of the national economy to the intensified path. This is the basis of solving the key problems of national economic growth: a cardinal increase in the productivity of labor and a strengthening of the production potential of the country. A further increase in the might of the Soviet government, the acceleration of its social economic progress and an increase in the people's welfare are unseparably tied to it.

In a leading place in solving this problem is machinebuilding, a complex of sectors that manufacture machines, equipment and devices for all areas of the national economy. It makes it possible to introduce into production the latest achievements of the scientific technological progress on a wide scale and reequip and develop further the national economy of the country which was stressed especially at the 25th party congress and the following Plenums of the Central Committee.

In recent years, USSR machinebuilders did much to equip leading sector of the national economy with high productivity machines and equipment. A wide network of scientific establishments, scientific production associations, experimental bases, design bureaus and design technological institutes played a great role in this. Fundamental research and developments which they carried out facilitated the creation of the newest equipment, progressive technological processes and control systems.

At present, the output of multifunctional machines and equipment, NC automatic machine tools and machining centers rises every year. The output structure has also improved. Qualitative changes occurred in many kinds of products. Their unit capacity, productivity and service life increased, while their unit material and energy consumption decreased.

The following were created in a very short time: complexes of the newest machines and equipment facilities, industrial robots, flexible production modules and systems which provide continuous, mechanized and automatic production processes. Such cardinal problems, as meeting the requirements of the country in machines for implementing provision and fuel-power programs, were solved. High efficiency equipment for ore-mining and petroleum-producing-ferrous and nonferrous metallurgy, transport and other sectors of the national economy was developed and manufactured on a high scale.

Production was mastered of equipment complexes for AES with 1 million kw and 1.5 million kw reactors, and TES with power unit capacities of 800,000 kw, designed for operation in Siberia with Kansk-Achinsk basin coal. For the first time in world practice equipment was created and is being manufactured to heat to nuclear power plants (ATS).

Work is being done systematically on increasing the share of trucks with diesel engines, as well as 14-ton dump trucks for transporting agricultural products and 110 to 180-ton truck-trains for operation in open pits.

It should be emphasized that today the basic requirements of the national economy in machine equipment are satisfied by domestic machinebuilding. Our country occupies a leading place in the world in the production of a number of its most important kinds, including equipment for nuclear power, electric locomotives, combines, tractors, metal-cutting machine tools and special equipment, diamond tools and agricultural machines.

The 1985 plan specifies tasks in all directions of scientific technological progress. Machinebuilding is oriented toward the continuous creation and mastering of new kinds of machines and equipment, an increase in introduction scales of leading technologies, renovation of products in enterprises being built, as well as in enterprises being modernized and reequipped.

An important problem today is the changeover from the creation of individual machines to automated systems in the entire technological cycle. This will make it possible to mechanize and automate all stages of production comprehensively, coordinate optimal parameters of individual products following a unified process and on that basis accelerate the reequipment of the national economy.

A further transformation will also occur in machinebuilding itself. In 1985 and in the future, the following will receive priority development: machine tool, tool and electrical equipment manufacturing, instrument making and agricultural machinebuilding. The output of high productivity forge-press equipment will increase by almost 13 percent. NC machine tools and robotized press complex manufacturing will increase 1.3 to 1.5-fold. It is planned during the year to introduce about 4000 NC machine tools and NC forge-press machines, including slightly less than 400 machining centers, and over 2000 flexible production modules and systems. Over 5000 industrial robots will be installed and over 1000 new mechanized, conveyor, automatic and semiautomatic flow lines. Many types of equipment are equipped with microprocessors.

This is the start of a long and promising path. According to the 1985 plan, the level of mechanization and automation of labor in machinebuilding, the largest group of workers in industry, will reach 65 percent, while for materials handling, transportation and warehousing work -- it will be about 60 percent.

Further expansion of fundamental research is planned to provide a scientific reserve for the 12th Five-Year Plan period and for long-range plans. Implementation of general-union scientific technological programs that span a wide-scope of problems will continue.

A search is being carried out to improve the economic mechanism. The role of economic stimuli is acceleration in creating, mastering and introducing new equipment and technology, improvement in contract discipline and an increase in deliveries of systems and complexes of machines and equipment.

Collaboration with CEMA countries plays an important role in the further rise of the sector and meeting requirements of the USSR in machinebuilding products. It facilitates the creation of new, progressive machines, equipment and devices, mastering their production in less time and with minimum cost.

The declaration about the basic directions in the further development and intensification of economic and scientific technological collaboration adopted at the economic conference of CEMA countries at the highest level, stressed that collaboration in machinebuilding will be of a comprehensive nature and targeted mainly to providing key sectors machines and equipment of high quality on the world level. The output is specified of finished products, parts and units, as well as products for general machinebuilding use and a mutual supply of spare parts. Special attention will be given to the development of electronics, microprocessors and robot equipment, as well as to flexible production systems.

This is because that today the main link of the economic strategy of the fraternal countries is scientific technological and the creation and introduction of new in principle equipment and technology. We have everything necessary for the successful solution of these problems: production capacity and a scientific-technological base, natural resources and skilled personnel. The nature of the planning of the national economies of socialist countries also plays a great role.

In the current five-year plan period, the collaboration of the USSR with the CEMA countries is implemented by over 220 agreements and contracts on specialization and cooperation of production, spanning over 15,000 items and type-sizes of machinebuilding products.

The USSR imports from the CEMA countries equipment for the oil and gas producing industry, progressive metalworking equipment, various equipment for agriculture, transportation devices (mainline passenger electrical locomotives, isothermal and passenger cars), ships for marine, river and fishing fleets. In their turn, CEMA countries receive from the USSR high productivity power, metallurgical, mining, materials handling equipment, road construction machinery, tractors, automobiles and other products.

Over 120 agreements are in effect in science and technology on the creation of scientific technological and design reserves, for the future, on the accelerated development and mastering of machines, equipment and devices which are material bases for the high productivity technologies being introduced in the national economy.

The greatest importance is placed on the creation, by joint efforts, of progressive machine and equipment systems for the automation of technological

processes in machinebuilding including flexible systems, as well as the development of modern transportation types.

The general agreement on multisided collaboration and organization of specialized and cooperative production of robots, of great importance to the national economy, is being implemented. This agreement contains the concepts of technical development and a summary of a priority list of products and their components which includes 165 types of industrial robots. Of these, 89 types are already in production, 23 have been created and 53 are in the development stage.

A complex of measures is being implemented in machine tool building on raising further the technical standard and quality of 142 machine tool models (27.6 percent of the total number mutually supplied in the current five-year plan period). According to the obligations adopted by organizations and enterprises of the USSR, 57 models of 157 exported are modernized.

Work is being done on creating new designs of NC machine tools, machining centers, flexible automatic systems, various technological groups, forge-press machines and other products. About 300 type-sizes of high productivity precision metalworking equipment have been manufactured.

Joint reserach on the direction of priorities in science and technology is constantly becoming of greater importance. One specification is specialization and cooperation in creating and manufacturing basic devices for the mechanization of materials handling and transportation-warehousing work. The division of labor spans 19 types of 320 items.

Efforts are being consolidated on organizing specialized and cooperative production of machinebuilding products also in other priority directions. Thus, in the area of machine complexes and equipment for strip mining and the construction of pipeline mains, a contract was prepared of multisided international cooperation in building heavy dump trucks which specifies collaboration on 13 types of machines and units. Their basic technical-economic indicators, preliminary volumes and times for mutual deliveries have been defined. A new 500 horsepower tractor is being developed. Prototypes of bulldozers and pipe-layers using such tractors have been prepared and tested in the USSR. Cooperative output of rotary complexes with productivities of 630 m^3/hour and higher was organized in the GDR, the USSR and the ChSSR.

An agreement was reached between USSR and Poland on work to be carried out in the PNR on raising the technical standard and quality of "Volya" type diesles, excavators, RR cisterns, equipment for splint-slab and wood-fiber plates, ship equipment and several other kinds of machines and equipment.

Specialized production is being organized of equipment for rational and economical utilization of fuel and energy by practically all types of power systems, including AES. Collaboration is developing on the creation of the newest equipment for fuller utilization of secondary power resources, as well as heat-recovery and heat-exchange equipment.

The extremely rapid development of electronics leads to serious technical and social changes, related to relationships between man and machine. With an increase in its intelligence properties there is an increased possiblity of imposing the solution of many control problems, data processing, etc. on the machine.

In this connection, it is especially important to dwell on the implementation of the general agreement on multisided collaboration on the development and wide use of microprocessors in the national economy. We are apeaking about the fact that coordination in developing and manufacturing this equipment and basic software will be achieved within the framework of the Intergovernmental Commission on Computers, while its utilization will be implemented within the framework of the CEMA Committee on Scientific Technological Collaboration.

To implement the collaboration program within the framework of the commission, plans for developing computer equipment have been developed. Microprocessors will be used widely on the basis of the newest microelectronic components and software.

The main areas of the wide use of micro and minicomputers were defined on the basis of the microprocessor equipment meeting requirements of world practice that make it possible to achieve the highest economic and social effect.

Also related to further improvement in the microelectronic base, micro and minicomputers is development work on the creation of a unified system for swtiching systems, NC machine tools and industrial robots, within the framework of respective multisided and two-sided agreements.

The socialist countries organized large scale cooperation in the production of equipment for nuclear electrical power plants that have no analogs in international practice. The development of a construction program for AES and AST for a period up to the year 2000 demonstrates forcefully again the unquestionable advantages of socialism in possibilities which it opens up for solving the most complicated problems of scientific technological progress through joint efforts.

The "Interelektro" has, as a basis of scientific technological collaboration, the problems of development and introduction in series production of standard series of basic, mass kinds of electrical equipment along the cycle of science-equipment-production-sales. This work is of a comprehensive nature : simultaneously with the creation of new kinds of electrical equipment products, when necessary, technological processes are improved, high productivity technological equipment is developed and progressive materials are introduced. This makes it possible to create competitive electrical equipment of a high technical standard, and reducing the consumption of scarce materials and electrical power in the process.

As far as products for general machinebuilding use are concerned, proposals were prepared for the creation of standardized hydraulic cylinders, hydraulic drives, miniature hydraulic apparatus and pneumatic equipment for automation, including NC machines and industrial robots. The implementation of these proposals will make it possible to raise the reliability of hydraulic and pneumatic systems by 30 percent, reduce unit metal consumption of hydraulic drives by 40 percent and pneumatic drives by 30 percent, and reduce power consumption by 20 and 25 percent respectively.

In manufacturing machines and equipment for the comprehensive mechanization of agriculture and animal husbandry, collaboration spans 265 kinds of tractors and agricultural machines, of which 115 (42 percent) are new and modernized products. Also about 70 other promising technical means are being created. Production of more than 600 kinds of machines and equipment for the efficient reprocessing of agricultural raw materials is specialized. About 80 new kinds of equipment are being developed for the food industry (including equipment for reprocessing fruits and vegetables, as well as machine systems for baking bread and the poultry-processing industry).

The share of progressive kinds of machines and equipment increased greatly in the structure of the output and mutual deliveries.

To raise the effectiveness of international socialist division of labor much attention is being given to the expansion of intraindustrial, part and unit specialization and cooperation, to a reduction of duplication in manufacturing one type of product, and the development of standardization and typicalization.

Problem No 1 today, faced by fraternal countries is a changeover to a comprehensive solution of problems. This means that collaboration must span scientific research and design developments, the organization of specialized and cooperative productions and mutual deliveries of products. It is important to changeover from the creation of individual types of machines and equipment to systems on the basis of standardized machines, units and parts for solving large sector and intersector problems.

As stressed at the economic conference of the highest level of the CEMA countries, there are at present considerable reserves for intensifying collaboration in machinebuilding and, in particular, in developing specialization and cooperation and in increasing mutual deliveries. This will facilitate more effective utilization of the production and scientific technological potential of the fraternal countries and higher welfare of the peoples.

The long-range strategy of socialist economic integration outlined by the conference specifies systematic imporvement of production and scientific technological ties for solving such key natural problems as acceleration of scientific technological progress, provision of countries with fuel-power and raw material resources, food consumer goods, etc.

Further solutions of large social economic problems such as an essential increase in the national income and implementation of many other measures depend to a considerable degree on domestic machinebuilding. "Its development,"

stressed Plenum of the CPSU Central Committee at the April (1985), must be given priority and its growth must be accelerated 1.5-fold in the 12th Five-Year Plan period. The main problem is a rapid changeover to the production of new generations of machines and devices for progressive technologies, an increase in the productivity of labor many times, a reduction in material consumption and an increase in the output-capital ration."

Great attention will be given to improving machine tool building, accelerating development of computers, instrument building, electrical equipment and electronics which are catalysts of scientific technological progress. This course will raise machinebuilding to a new, higher level and raise the reliability and quality of products, thus making it possible to organize the production of new kinds of high productivity equipment that can compete with best specimens in the world. Therefore, it is necessary to stop manufacturing outdated types of machines and equipment.

To raise the technical standard of machinebuilding the next five-year plan specifies a 1.8-fold increase in the introduction of flexible systems and a 2-fold increase in industrial robots. The necessity of the wide application of flexible systems is dictated because they open up possibilities for changing over to an output of related products in a short time at a production cost close to that achieved in stable mass production. Measures are being taken on the wide introduction of NC automatic and semiautomatic equipment and built-in microprocessors, rotary and rotor-conveyor lines, and automatic design and control systems.

The reequipment of production, especially on the basis of flexbile modules and systems, NC equipment and machining centers using microprocessors and minicomputers will improve the conditions of labor drastically, increase its intensity and make it more creative which, in turn, will facilitate an increase in productivity of labor and the solution of important social problems.

All this will make possible a radical improvement in the technical standard and quality indicators of the output, increase the reliability and service life of most important of its kinds by 25 to 30 percent, reduce unit metal consumption by 15 to 20 percent and increase fuel and energy efficiency by 10 to 15 percent.

By 1990, the share of products manufactured for three years will increase to 36 percent. The share of products manufactured for the past 10 years will decrease considerably. They will be replaced by new highly efficient equipment. The volume of machinbuilding products mastered in the USSR for the first time, will increase 2 to 2.5-fold in the 12th Five-Year Plan period. Taking into account customer requirements, it is planned to introduce new generations of machine systems, automatic machine tool lines, sets of forge-press equipment, and agricultural equipment and tractors. Their productivity by the end of the next five-year plan period will be 1.5 to 2-fold more than at present. It is also planned to create new in principle equipment and technology that will increase labor productivity 3 to 5-fold.

Collaboration with fraternal countries will play an important role in solving these urgent problems on a multisided and two-sided basis.

As stressed at the economic council, while valuing highly the achieved results, today it is necessary to concentrate efforts on problems not yet solved. In this connection, the intergovernment commissions on economic and scientific technological collaboration and CEMA organs are doing corresponding work to coordinate plans for the next five-year plan period and supplement and extent existing agreements and sign new ones. Special attention is being given to raising the technical standard and quality of machinebuilding.

At present, there are a number of long-range programs between the USSR and CEMA countries on science, equipment and production to the year 2000. Planned volumes of mutual deliveries have been discussed.

The development and consequent implementation of the comprehensive program for scientific technological progress of CEMA countries for 15 to 20 years will play an important role. It will help to concentrate efforts on the main, decisive directions for developing electronic equipment, facilities for comprehensive mechanization and automation of production, including industrial robots and flexible production systems, nuclear power, new materials, technologies and biotechnology.

To accelerate scientific technological progress and raise machinebuilding standards, the economic conference at the highest level and the 39th meeting of the Council adopted a resolution on forming a CEMA Committee on Collaboration in the Area of Machinebuilding.

The most important directions must be as follows:

create and master the newest machines, equipment and devices, and power, material and labor saving technological processes; raise the technical standard, equality and rate of renovation of manufactured products;

by their joint efforts, manufacture products not produced in CEMA countries or manufactured in insufficient quantities;

improve the structure and reequipment of the sector; improve coordination in individual production facilities for solving problems of mutual interest; use existing capacities more effectively as well as those being built;

develop scientific technological and production cooperation; use achievements obtained as a result of collaboration widely;

eliminate unjustified duplication in the manufacture of a single type of products; develop standardization and typicalization; expand intrasector and unit specialization and cooperations;

organize specialized production of units and products for general machine-building use in volume to satisfy requirements of all machinebuilding sectors; provide spare parts for mutually delivered equipment.

Activization of collaboration here will make it possible to form machinebuilding complexes in each of the fraternal countries more efficiently and accelerate the utilization of the achievements of scientific technological progress.

The committee and its permanent working organs must give special attention to the organization of specialized and cooperative production:

flexible systems for the machinebuilding of technological equipment with the limited participation of service personnel, especially, in the 2d and 3d shifts; increase the equipment shift coefficient up to 2.5-fold; productivity -- 2.5 to 3.5-fold and reduction of production areas -- to 1/2 - 1/3;

develop promising equipment for automation of technological processes by the wide introduction of microprocessors;

develop promising designs of automatic NC manipulators on a modular base for various sectors of the national economy, etc.

The coordination of efforts of machinebuilders of fraternal countries on a new organizational level must contribute to solving the most important problems of the social economic development of CEMA countries and strengthen their technical economic independence, thereby strengthening the position of socialism in the world.

The duty of workers in the machinebuilding complex of the USSR is to do everything possible for the most rapid changeover of the economy to the intensive path of development to raise its effectiveness and meet the 27th party congress of the Soviet Union with specific results.

Co-development of Robot Technology

Moscow EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV in Russian
No 8, Aug 85, pp 40-42

[Article by Evgeniy Yurevich, doctor of technical sciences, Director and Chief Designer of the Scientific Research Institute of Robot Equipment and Technical Cybernetics at the Leningrad Polytechnical Institute imeni M. I. Kalinin, General Designer and Chairman of the Council of Chief Designers on Industrial Robot Equipment of CEMA Countries: "Robots for the National Economy"]

[Text] Robot equipment is one of priority directions being developed at present within the framework of the CEMA comprehensive program for scientific technological progress for the next 15 to 20 years. The economic conference at the highest level considered collaboration among the most important at the modern stage in this sector.

Robot equipment is a scientific technological direction whose purpose is the creation and use of a new type of equipment for mechanizations similar to those done by human hands. Usually, robots are considered a means of

automation. Actually, they are used widely for that purpose. Today, robots are used for servicing forge-press equipment, metal-cutting machine tools, electrical plating lines, casting and other kinds of modern equipment. However, their role is much wider. More and more frequently, they are used for assembly and monitoring-measuring operations, painting, welding, etc.

Thus, along with automation and mechanization of physical labor, robots are becoming the most important and universal kinds of basic technological equipment in all sectors of the national economy without exception. Therefore, at present, the level of their development becomes one of the important indicators of the scientific technological potential of a country. They also play a great role as a means for humanizing labor for socialist governments.

Practice confirms that the objective pattern of modern machinebuilding production consists of simplifying basic manual operations and their increased monotony. As a result, on one hand, they become less prestigious and, on the other hand, they lend themselves more and more to robotization. This makes their rapid growth necessary.

In 1984, the number of industrial robots in the USSR exceeded 20,000 or triple that of 1980. In volume of their production and use, the Soviet Union is in one of the first places in the world. New problems they face in recent years are related to work on creating flexible production in machinebuilding and the intensification of the national economy.

Along with the further expansion of the product list, the sharp increase in their technical standard, especially reliability becomes of special importance. As far as the product list is concerned, we are talking primarily about increasing the types of electromechanical robots (with a corresponding reduction in the share of pneumatic and hydraulic robots) and the development of a technical means for sensing, including sight.

Other CEMA countries are also giving great attention to the new sector. In the NRB, for example, in 1981-1985, the number of industrial robots increased almost 10-fold and exceeds 3000. Among them, are type "Pirin" automatic manipulators, which acquitted themselves well in the USSR and other CEMA countries, pnrumatic, hydraulic and electromechanical robots for servicing metal-cutting machine tools, presses, plating and welding. Some of them are licensed, while others have been developed jointly with the USSR and other fraternal countries.

By the end of 1985 in the ChSSR, as well as in the NRB, 3000 basically pneumatic robots will be used to service presses and unit -head machine tools.

Robot equipment is developing at a rapid rate in the GDR which adopted probably the most intensive program. By the end of 1985, over 8000 industrial robots will be in operation here, while together with simpler robot equipment means (automatic operators, etc.), their total number will reach 45,000. They will be used to service various technological equipment and perform such basic operations as welding and assembling.

In the PNR, domestic developments are combined with mastering licenses of the best foreign brands. As expected, by the end of 1985 the number of robots in the country will exceed 1000.

Robot production is also being organized in the VNR. At present, a considerable part of the equipment, including several hundred units, is imported from the CEMA and other countries. High quality industrial robots are being manufactured now, including those for delivery to the USSR. Prototypes of following generations are being developed.

In the SRR, robot equipment development is tied primarily to collaboration with other CEMA countries, as is specialization in the development and output of components and individual robot types, including equipment for exports to partners.

The development of robot equipment is also implemented on a two-way basis. For this purpose, for example, in March 1985 the USSR and the ChSSR formed an international "Robot" Scientific Technological Association, whose primary problem is the creation of robotized technological complexes for machining, die forging and assembling.

Collaboration of CEMA countries in creating, manufacturing and using robot equipment began to develop at the same time as work done on the national scale. The basic forms were multisided and two-sided agreements. Up to 1982 the following multisided agreements were of special importance:

on scientific technological collaboration in 1980-1985 to create modern industrial robot-manipulators for various purposes;

on scientific technological collaboration in 1980-1985 to improve and create NC machine tools, forge presses, automatic lines and automated sections with industrial robots-manipulators;

on scientific technological collaboration on the problem "Development of scientific bases for new technological processes in welding, hard facing and thermal cutting of various materials and alloys to obtain welded structures and create effective welding materials and equipment."

A qualitatively new stage was the concluding in 1982 of a general agreement on multisided collaboration to develop and organize specialized and cooperative production of industrial robots. A Council of Chief Designers (SGK) of the CEMA countries was created on industrial robot equipment. The basic problem posed to it was to prepare the following:

technologically substantiated specifications for basic sectors of the national economy, their standardization and definition of estimated requirements up to 1995;

summary specifications for them and recommendations for the standardization of basic parameters and areas of application;

specifications for the standardization of components and their requirements, including those for control devices, electrical, hydraulic and pneumatic drives, electronic equipment, clamping devices, software, etc.;

summary of high priority product list of robots and their standard components.

Existing agreements are to be analyzed on the basis of the results of the solutions to these problems and, if necessary, they are to be corrected or new ones concluded that would facilitate further development of specialization and cooperation on a unified scientific technological basis.

At present, a concept of technical development of robot equipment was prepared within the framework of the Council of Chief Designers. At its basis is the idea of comprehensive standardization. It includes the mechanical part, control systems and software. The basic principle of standardization is modular design which was used successfully before in creating metal-cutting machine tools, including NC, computers and other latest equipment.

An important result of the SGK work is the definition of the priority product list of robots and their components. It contains 165 items of which 89 (54 percent) are already being manufactued, 23 (14 percent) have been created and 53 (32 percent) are being created. This means that today we have about 1/3 of robot types required by 1995. The remaining ones will be developed in accordance with the general agreement. Much has been done also on whether there is duplication in robot types and components, and what problems should be solved in the very near future.

Jointly with the institute, the CEMA council prepared a program for comprehensive standardization of robot equipment in the period up to 1990. The program includes 22 standards and 10 methodological and data materials, including types and series of industrial and their components, on modular design, etc.

Based on the analysis of trends in development of robot equipment required by CEMA countries, the council adopted the following programs:

create a promising modular electromechanical robot with technical sight and other sensing means;

develop and master production of standard components, modules and modular industrial robots.

The purpose of the first one is to intensify work along the main directions of robot equipment, the second -- the wide use of the newest equipment in all sectors of the national economy.

On the basis of these materials, corresponding organs of the CEMA prepared proposals on the development of scientific technological collaboration, including joint manufacturing and mutual deliveries of finished products and their components.

In the course of implementation of the general agreement, a number of difficulties arose which must be overcome in the very near future. Thus, permanent sector CEMA committees, when deciding on questions related to the development of robot equipment, still do not take into account sufficiently the priorities in the robot product list. There are also delays in presenting manufacturing specifications for the products to the Council of Chief Designers. A number of organizational questions, im particular, the interrelations between the SGK and other CEMA organs, have not been solved finally. The output of the first jointly developed brands of industrial robots is being organized slowly. Mutual deliveries are not always made on time.

At present, efforts are being concentrated on solving three problems:

improvement of the summary of the high priority product list of robots and their components by reducing duplication and using modular design;

evaluation of the technical standard of products and implementation of measures for raising it, especially, with respect to reliablity and competitiveness in the world market;

standardization and typicalization.

Their solution plays a considerable role in raising further the technical standard of socialist production, especially, if it is taken into account that according to the general agreement signed at the 40th meeting of the CEMA, it is planned to develop and organize specialized and cooperative output of flexible production systems. Robots, as is well known, are their important component parts.

The importance of robots is also great in solving other complicated scientific technological and production problems. Therefore, we must win the most forward positions in the world not only in quantity, but also in the assortment of types and in the technical standard of robot equipment.

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INDUSTRY PLANNING AND ECONOMICS

MINSTANKOPROM MEETING REVIEWS MODERNIZATION DRIVE

Moscow ECONOMICHESKAYA GAZETA in Russian No 29, July 85 p 6

[Article by M. Makhlin: "What Is the State of Machine Tool Building: Notes from the Meeting of the Ministry of the Machine Tool Building Industry Board"]

[Text] Among the measures taken by the party to accelerate the scientific and technical progress, a key place has been afforded to developing and improving the nation's entire machine building sector. The success of the radical improvement of the state of affairs in this very important area of our economy directly depends on machine tool building, which has been called upon to lead the other machine building industries, paving the way to work-standard achievements.

How is this sector shouldering the task entrusted to it? What needs to be done to reach the new, considerably higher targets set by the party? The answers to these questions were confronted by the Ministry of the Machine Tool Building Industry board, which met on July 9 to discuss the decisions of the June CPSU Central Committee meeting. In its work participated enterprise directors and chief engineers, party secretaries and union representatives, as well as scientists and innovators.

In General and in Particular

Characterizing in his report the work of this sector, Minister B.V. Balmont noted that in the 11th Five-Year Plan machine tool building achieved higher production growth rates than industry as a whole. Production of machines with Numerical Control [NC] has increased during the five-year plan 2.5 times, and automated conveyor lines have increased 1.6 times. Yet, the growth rates of the automated equipment output have not been sufficient. Thus, the need for machines with NC has been satisfied only by about 60 percent. The output mix of equipment and instruments with intersectoral applications, and especially the quality of many of them, do not fully correspond to the urgent tasks of the economy's development at the present stage.

As is well known, the Ministry of the Machine Tool Building Industry has been put in charge of implementing an over-all technical polciy in the area

of creating, producing, putting into operation and servicing industrial robots and flexible machine systems at machine tool building plants. The leading role assigned to the sector in this new and very promising direction of the scientific and technical progress entails an important responsibility.

The report listed as positive factors that 50 percent of the sector's products were awarded the Mark of Quality, and that 35 percent of its products have been produced for less than 3 years--the measure showing the novelty of the products. But these figures could--and should--be examined from a more critical standpoint in the spirit of current requirements. Half of the Ministry of the Machine Tool Building Industry's output has not received top-quality certification and almost two-thirds of it consists of goods introduced more than three years ago.

The minister admitted that "the general quality of the output does not fully meet modern requirements." In 1984, for instance, Gosstandart banned deliveries of goods from 112 of the sector's enterprises because they did not correspond to GOSTs [All-Union State Standards] or did not meet technical requirements. Having named the plants and enterprises that produce substandard output, the speaker summed up: "it is doubtful that the remedies for these plants can be prescribed from above."

Indeed, makers of shoddy goods can be dealt with more simply in their labor collectives. Yet today the concept of output quality is interpreted much more broadly. It is, above all, at a high technical level. And here the decisive role is played by the sector's headquarters.

In his speech USSR Gosstandart Deputy Chairman A.V. Skripnikov pointed out that a considerable number of technical standards developed by the Ministry of the Machine Tool Building Industry are not being approved because they do not correspond to the contemporary level of scientific and technical development and that a noticeable number of technical requirements currently in force in the sector differ from GOSTs. The alarming situation with quality was mentioned in other speeches as well. It is a pity that the measures planned by the Ministry of the Machine Tool Building Industry to considerably improve quality were not revealed.

The New Five-Year Plan

The main emphasis was placed by the board meeting on preparing for the 12th Five-Year Plan. Planned figures require the Ministry of the Machine Tool Building Industry to increase considerably its production volume over the expected ones during the current five-year plan. The prospects are truly impressive.

The sector intends to exceed the original targets of the 12th Five-Year Plan. The output of machines with NC is to be more than doubled, and that of automated conveyor lines increased 1.6 times. Annual deliveries of processing centers and industrial robots will rise several times.

"It is for the first time that production of equipment of, so to speak, a new generation will reach such a scale," declared the minister, citing as an example the planned schedule for production of flexible automated production modules--"machine-robots," package press and forge equipment and package automated foundry equipment.

From the point of view of quantity, a fairly rapid rate of acceleration is being planned. But everything is relative. Will it decisively lift machine tool building to a higher stage of technical development?

Ivanov Machine Building Enterprise's Chief Engineer Yu. V. Maslovskii, Moscow Machine and Instrument Institute's Dean Yu.M. Solomentsev and other speakers noted that the world is at the threshold of a transition to the next generation of flexible modules. Is the Ministry of the Machine Tool Building Industry ready for such a transition? What is the true content of its planned figures for the automated equipment production?

Today's flexible industrial module must include a storage capacity, auxiliary functions, facilities for loading, switching to different types of output, waste removal, automated self-diagnostic control and retooling. Thus far, the Ministry of the Machine Tool Building Industry has produced equipment featuring one of the other of these, but not the full range of functions. Essentially, they are robitized package installations, not flexible modules.

Particular attention should be devoted to the over-all technical policy of creating machining centers--the most productive, and expensive, type of equipment. However, the ministry has not yet defined the head organization's rights and responsibilities in this task. It has been noted that the unjustified plethora of narrowly specialized technical design organizations in the sector may have a negative effect on resolving problem of reconstructing and technically retooling the enterprises. These questions call for immediate measures from the industry's headquarters.

Monologues or Discussions

The agenda contained some vitally important questions for the sector. How were they addressed? The board had been called together, but no member of the board and no VPO [All-Union Production Association] head spoke. Unpreturbed by blunt questions, the speaker with rare exceptions did not stray from prepared texts.

VPO Soyuzkuzmash was repeatedly criticized. Yet it was not called upon to answer the criticism.

Moscow Stankolit Plant's party committee secretary, I.N. Klimov, criticized NPO [Scientific-Production Association] VVIIlitmash for delays in developing a liquid solidifier needed by the industry. The NPO's General Director, E.B. Krakovskii, spoke about this work, but in positive tones, essentially not responding to the criticism.

The stage was offered to the managers of the most successful enterprises, while the large group of those who have been falling behind was allowed to remain silent. The prearranged character of the "function" did not reflect well on its content. The management sector, gathering in full force, was in fact hearing reports of achievements and lists of problems which are usually dealt with, as they say, at the work place.

Suppliers were extensively criticized. Machines, apparently, are good, but instruments, electronics and electronic equipment are "not up to standards." And why had not representatives been invited from the Ministry of the Instrument Building Industry, the Ministry of the Electronic Industry or the Ministry of the Electronic Equipment Industry? They were not in the audience. The criticism was wasted.

The USSR Council of Minister's Deputy Chairman A.K. Antonov, speaking at the board meeting, stressed the most important aspects of the Ministry of the Machine Tool Building Industry's actions to accelerate the scientific and technical progress and improve the work style and methods under the new conditions.

At the CPSU Central Committee meeting on accelerating scientific and technical progress, it was noted that it is necessary to strengthen the spirit of self-criticism and a businesslike atmosphere, to develop initiative and persistence in overcoming defects and to increase the accountability of the personnel. This forms the basis of reaching the goals set by the party.

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INDUSTRY PLANNING AND ECONOMICS

PROGRAMS FOR WORKER RETRAINING SOUGHT

Leningrad LENINGRADSKAYA PRAVDA in Russian 31 Jan 85 p 2

[Article by O. Nosareva: "A Life-Long Academy"]

[Abstract] Vocational-technical education in the Leningrad area prepares many new workers in fields of production automation. Older workers must be retrained in new skills connected with production automation. A recent conference of heads of technical education departments at a number of the largest Leningrad associations discussed ways to solve the problem of retraining. They admitted that their departments often are not able to provide proper retraining. One reason is that teaching of skills such as programming requires a more thorough, programmed approach than that used in traditional skill-improvement courses. It is difficult for the association departments to develop such programs on their own. The Leningrad Metal Plant Production Association several years ago decided to base their retraining program on Leningrad's system of 11 evening vocational-technical schools, because the schools had experienced teachers, well-developed programs and well-equipped facilities. The Pozitron Association has been using these schools for 13 years to retrain its workers in new, highly technical skills; the association has even opened evening branches at its enterprises. Despite these clear advantages, the vocational-technical schools are growing slowly. Many technical education departments find it disadvantageous to use evening vocational-technical schools for one simple reason: the decades-old statistical reporting forms they send to the Central Statistical Administration do not have a blank for evening vocational-technical schools, although they provide for courses and leading-experience schools. The form should be updated. This change would be especially helpful for small and medium-sized enterprises with small technical education departments. Evening vocational-technical schools with a network of enterprise branches can and should become sector centers for retraining and skill improvement.

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INDUSTRY PLANNING AND ECONOMICS

PROCEDURAL SOLUTIONS TO RAISE PRODUCTION EFFICIENCY

Kiev EKONOMIKA SOVETSKOY UKRAINY in Russian No 6, Jun 85 pp 92-93

[Article by Candidate of Economic Sciences N. Goncharova: "Efficiency in Machine Building"]

[Text] Machine building, it is well known, is the core of the scientific and technical progress. Moreover, as the development of science and technology accelerates, the role of machine building in the nation's economy increases.

The volume under review (Footnote 1) (Ilyenchenko, M.B. "How to Increase the Efficiency of Machine Building." Kiev, TEKHNIKA, 1984, 127 pages.), treats relevant problems of analyzing the work of machine building associations (enterprises), of increasing production efficiency of this basic industrial sector, of improving the methods of planning and evaluating the work of enterprises, and of developing cost-accounting management methods.

The book delineates the main direction of upgrading and diversifying the sectoral and technical composition of the stock of machine building equipment and of improving its utilization. An acceleration of the renewal of the means of production (machines, equipment and instruments) is a distinctive but natural development in socialist industry under the conditions of accelerated scientific and technical progress. The author sets economically expedient limits on spending for equipment repairs and analyzes the factors that influence production costs, noting that the volume of repair work has grown unnecessarily high and offering a comprehensive system of service and repairs for machine building equipment that he himself has tested.

The book examines fairly representative group of UkSSR machine building enterprises--integrated plants which perform a complete production cycle and which specialize in output that has application in machine building. The book makes a comparative analysis of the enterprises' economic indicators and offers ways to raise the accuracy of production cost budgeting. The managerial staffs of these enterprises should certainly be interested in the cost computing model developed by the author, as well as in his proposals on how to compute the standard of profitability and on how to calculate more fully the share of profits in prices.

The author's proposed improvements in the process of technical and economic planning for machine building enterprises are also worthy of attention. They are particularly timely, given the current drive to develop and implement automated management systems. Describing the general framework for solving problems of technical and economic planning, the author focuses his attention on the problem of choosing the most efficient production targets for an enterprise as a whole as well as fof its individual components. As a benchmark of efficiency he uses the ability to produce maximum net output.

His recommendations concerning the preparation of data needed to solve problems of technical and economic planning are also useful. There is no need to stress once more the extent to which the volume--and, most importantly, the accuracy--of such data impact on the accuracy of the solution. The book not only indicates what data is required, but also lists its sources and describes how it should be used in calculations. A separate, particularly important component of technical and economic planning, stresses the author, is determining an economically expedient volume of major repairs; he offers an example how a plan for major machine and equipment repairs can be worked out, complete with a detailed description of how the plan's targets should be arrived at.

An important place in the book is afforded to questions of improving the organization and management of a machine building enterprise, the development of cost accounting and, especially, strengthening of its principles at the auxiliary plants. Using and generalizing the experience of successful enterprises, the book provides a rational managerial model for the entire enterprise, its main output line, its technical departments, and various services.

Although the overall assessment of the book is positive, there are some defects to be noted. The presentation of the material in the first paragraph of the first chapter is rather fragmentary. The analysis of Table 7 (pages 24-25) does not correspond to the material it contains. References to Tables 4 and 5 are imprecise (pages 16, 18 and 24).

As a whole, however, the book describes the fruitful results of an applied study. It should be of interest to specialists in economics, planning and the machine building industry.

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INDUSTRY PLANNING AND ECONOMICS

MASSIVE INCREASE IN NEW PRODUCTION CAPACITY EXPECTED

Moscow EKONOMICHESKAYA GAZETA in Russian No 35, Aug 85 p 1

[Article in the column "Advances of the New Five-Year Plan": "Basis of Scientific and Technical Progress"]

[Text] The decisive work in reequipment of all sectors of the national economy on the basis of modern achievements of science and technology belongs to machine building. Its development in the 12th Five-Year Plan has been given a priority character. The chief task, as emphasized at the April (1985) Plenum of the CPSU Central Committee, is to quickly go on to the production of new generations of machines and equipment that would be capable of ensuring the introduction of progressive technology, higher labor productivity, manifold reduction of materials intensiveness and boosting of yield on capital. The key role of machine building and the need of accelerating the development of the machine-building complex were emphasized with new force in M.S. Gorbachev's address at the conference at the CPSU Central Committee on questions of acceleration of scientific and technical progress.

Recently, the CPSU Central Committee and the USSR Council of Ministers designated a complex of measures for radically raising the technical level and quality of machine-building production and development of machine building as the basis of scientific and technical progress in the 12th Five-Year Plan and over the long term to the year 2000.

It is planned to carry out progressive structural changes in machine-building production, shifting to deliveries of machines, equipment and instruments in complete sets with wide-scale organization of firm repair and servicing of complicated varieties of equipment, deepening of specialization and expansion of cooperation in machine-building production and its reequipment and modernization on the basis of wide-scale introduction of new manufacturing processes and systems and advanced methods of labor and operational organization.

The tremendous potential prospects of domestic machine building and highly effective developments of Soviet scientists, designers and technologists make it possible to see to it that the new varieties of equipment exceed in productivity and reliability no less than 1.5-2.0 fold preceding analogs and

reduce three-fourfold the time required for carrying out research and development.

A rise in the technico-economic level of manufactured products is under the present conditions a most important obligation and norm of work by each production and scientific collective. A sense of high responsibility and pride for quality of production with the designation of "Made in the USSR" must be felt by each person who participates in its manufacture.

On the example of the AvtoVAZ Association, leading collectives of machine builders are assuming commitments for the 12th Five-Year Plan which exceed control figures. Joint commitments of the production associations Novokramatorskiy Mashinostroitelnyy Zavod, Uralmash, Electrostaltyazhmash and the VNIImetmash Scientific-Production Association aim at higher gains in manufacture and utilization of new equipment. A creative attitude in working out control figures was displayed at enterprises of the Ministry of Power Machine Building.

At the conference held 23 August at the CPSU Central Committee on questions of developing plans of economic and social development of the USSR for 1986 and for the 12th Five-Year Plan, emphasis was given to the special responsibility of machine-building ministries which are being allocated large financial and material resources for the forthcoming 5-year period. It is sufficient to say that capital investment for the development of machine building during 1986-1990 will exceed 1.8-fold the resources utilized during the 11th Five-Year Plan.

But as the technico-economic surveys and letters of our readers published by EKONOMICHESKAYA GAZETA show, not all economic managers are facing as yet the question of new technology. Cases exist of delays connected with working out plans of production reequipment, late completion and insufficiently thorough working up of control figures for the new five-year plan. Frequently innovations, holding promise of large national-economic results, are not utilized in mass production.

Comprehensive economic validation of new equipment is required. In a number of cases, expensive flexible production operations and robot complexes fail to provide the required yield and occasionally even have a negative effect on economic results. Economic science and sectorial scientific-research institutes have to work up reliable recommendations for determining the effectiveness of new equipment. Its economic validation must be founded in the new standards.

It is a matter of honor for labor collectives of machine builders to improve in every possible way drafts of plans for 1986 and the 12th Five-Year Plan while taking into consideration new tasks in the development of the economy, to fulfill the targets and commitments of the current year as an initial basis for the attainment of significantly higher gains and to worthily greet the 27th party congress.

Table. Growth of Production of Automatic and Semiautomatic Lines (units) and Automatic Manipulators (thousands each)

	1975	1980	1984	1985(plan)
Automatic and semiautomatic lines	736	814	1,068	1,121
Automatic manipulators with programmed operation	0.1	0.6	14.1	14.3

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INDUSTRY PLANNING AND ECONOMICS

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ABSOLUTE COST-EFFECTIVENESS OF NEW PRODUCTION TECHNOLOGY CALCULATED

Moscow MEKHANIZATSIYA I AVTOMATIZATSIYA PROIZVODSTVA in Russian No 10, Oct 85 pp 31-33

[Article by L. I. Zhukov and G. Kh. Gendler, doctors of economic sciences, V. A. Lovkov, candidate of economic sciences: "Evaluation of Effectiveness of Introducing New Automatic Equipment"]

[Text] At present many enterprises in the country are actively introducing robots, manipulators, machining centers and flexible automated systems. The introduction of new equipment, new technology and the acceleration of social-economic development on this basis -- this is the strategic line of the economic policy of the party. The introduction of achievements of scientific-technological progress must be based on the selection of the most effective solutions that produce a multiple increase in the productivity of labor. The role of self-repayment of new equipment increases. Comrade M. S. Gorbachev, General Secretary of the CPSU Central Committee, at the conference on accelerating scientific-technological progress, characterizing the special features of the economic policy of the party at the modern stage, stressed "... measures being planned on acclerating scientific-technological progress must be self supporting. They are being carried out in order to increase the productivity of labor and, therefore, to accelerate the growth of the national income.*

Therefore, the economy of the country requires not just any automatic systems, but the most efficient ones. This determines the importance of selecting ways to develop the automation of production, economic comparison of versions and the finding of the most productive and economically efficient ones.

It should be kept in mind that until recently, the effectivness of introducing automatic equipment was considerably behind the effectiveness in other directions of technological progress.

The effectiveness of measures for the automation of production and the introduction of highly efficient equipment (annual economic effect) is approximately half of all measures of scientific-technological progress as a whole, while the cost repayment time is 1.5-fold greater.

* PRAVDA, 12 June, 1985

It is also necessary to stress the presence of objective circumstances, particularly the fact that primary mechanization is less costly per one freed workers and especially, is repaid faster in secondary mechanization than automation. This is due to the necessity of a considerable increase in skilled workers who service flexible manufacturing systems (GAP), insufficient volumes of personnel training for servicing such systems and many other reasons. It is difficult to draw precise conclusions with respect to effectiveness (according to statistical data).

The insufficient effectiveness of introduced automated equipment is also related to the lack of a systematic approach and, sometimes, also to neglect of the economic side of introduction.

An example of a scientifically substantiated selection of effective ways to automate production is the "Intensifikatsiya-90" regional-sector program, developed in Leningrad and approved by the CPSU Central Committee. The program specifies the formation of integrated production complexes which include systems for automating scientific research, design, the technological preparation for production and the control of flexible manufacturing systems. As shown by calculations, integrated production complexes are twice as effective as separate automated systems and mechanization facilities. In 1990, there will be created in Leningrad four large automated production facilities, about 300 automated shops, sections and lines, over 1700 units of radio-engineering equipment and 89 automatic design and production preparation systems. The economic result of this automation will be expressed in the following indicators: the rates of growth of the productivity of labor will increase 1.5 to 2-fold; production costs will be reduced by 5 to 7 percent; the ratio of manual labor will decrease by 10 points (from 37 to 27 percent); requirements in industrial-production personnel will decrease by almost 100,000 persons and the share of products of the highest category of quality will increase 1.8-fold.*

The successful implementation of the "Intensifikatsiya-90" program requires the development of its methodology, in particular, the selection of versions of scientific-technological progress that ensure maximum economy of living and the embodied labor. This is especially urgent for the evaluation of the effectiveness of automated systems, including the flexibly-readjustable ones.

In existing methods for the evaluation of effective new equipment (they concern, obviously, new facilities for automation production processes) basic attention is given, as is well known, to the evaluation of comparative (relative) effectiveness. When it is necessary to select from several versions of the solutions of a technical problem, the optimal version is necessary, or when the proposed solution has its analogs. However, the creation of new in principle equipment and technology (including latest production automation systems based on the use of microprocessors) requires, first of all, the evaluation of absolute effectiveness. There is no such a methodology regrettably which is the partial reason for the adoption of absolutely ineffective solutions with repayment schedules considerably exceeding norms, and even generally not repayable.

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* "Intensifikatsiya-90". Leningrad, Lenizdat, 1984, p 19.

On the other hand, it is necessary to change in principle the very approach itself to the evaluation of the economic effectiveness of the new equipment. Most frequently, the introduction of new equipment is ineffective due to economic and organizational conditions which cannot be ignored in evaluating progressive equipment. This requirement is especially urgent for the expensive equipment used in flexible production systems (GPS); in this case effectiveness must be determined for the optimal functioning conditions of these systems. The cost of changing the conditions of utilization of the automated systems and bringing them up to optimal must be taken into account in the costs of the new equipment.

The most objective characteristic of the absolute effectiveness of automated systems is, in our opinion, an indicator of change in the productivity of social labor that takes into account changes in the cost of living, as well as embodied labor. In the final result, the replacement of living labor by embodied labor -- is the basic economic result of using the latest equipment. An important and complicated problem is a scientifically substantiated full evaluation of the total production costs per unit product.

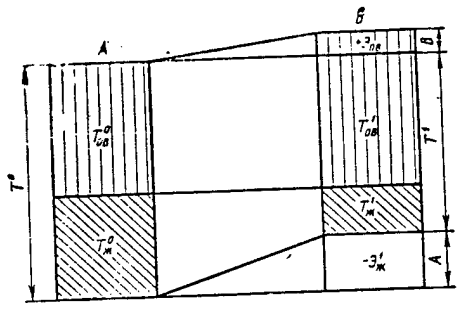

Fig. 1. Arrangement for determining the criterion of economic effectiveness of using new equipment, including automatic production facilities:

A -- basic period, B -- planned period.

So far, there is still no special methodology for evaluating the economic effectiveness of introducing the latest equipment, including automated equipment, by measuring the ratio between past and living labor, incorporated in the new equipment, displaced by this equipment.

The methodological basis for solving the posed problem may be the indicators of the cost of the equipment, and the organizational structure of production which, as written by K. Marx, "we fairly frequently will have the possibility of observing that changes to C, V and m also assume at the same time changes

in the productivity of labor."* Such indicators can be calculated practically on the basis of the money evaluations of production costs and profit. An analysis of the structure of the cost of production of the compared versions will show how the costs of its separate components changed. Production cost components in the cost expression may be represented by the money expression paid for living labor (wage fund); costs of raw and other materials, fuel, etc.; and amortization deductions.

The costs of social labor in product manufacturing can be represented by formula

$$C = C_1 + (C_2 + C_3)$$

where C -- total costs of social labor; C_1 -- costs of past embodied labor; $C_2 + C_3$ -- costs of living labor, or the newly created cost, including C_2 -- cost created by the necessary labor; C_3 -- cost created by additional labor.

From here the boundary of using new equipment may be

$$C_1 < (C_2 + C_3),$$

where C_1 -- cost of manufacturing new equipment; $C_2 + C_3$ -- saving in living labor obtained in the process of new equipment functioning.

The economic effectiveness of new equipment is

$$\frac{C_2 + C_3}{C_1} > 1.$$

Thus, a criterion for applying new equipment is the saving of social labor, while the schematical economical boundary of its application is determined (Fig. 1) as follows:

$$\Theta = (T^0_{ж} - T^1_{ж}) - (T^1_{ов} + \Theta^1_{ов} - T^0_{ов}) = T^0 - T^1 = \\ = -\Theta^1_{ж} + \Theta^1_{ов}$$

Since, A > B (saving in living labor overlaps additional costs of embodied labor), then

* Marx, K., Engels, F. Collected Works, V.5; part 1, p 59.

$$I = \frac{T^0_{ж} + T^0_{ов}}{T^1_{ж} + T^1_{ов} + \vartheta^1_{ов}},$$

where ϑ -- saving in total costs I (living and embodied labor) due to the introduction of new equipment; $+\vartheta'_{сэ}$ -- overexpenditure (additional costs) of embodied labor; $-\vartheta'_{эк}$ -- saving in living labor; $T^0_{сэ}$, $T^1_{сэ}$ -- costs of embodied labor in the basic and planned (report), periods; $T^0_{эк}$, $T^1_{эк}$ -- costs of living labor in the basic and planned (report) periods; I -- labor productivity index due to the introduction of new equipment.

This arrangement is based fully on instructions by K. Marx who stressed that increasing the effectiveness of social labor consists in that the share of living labor decreases: $T^0_{эк} > T^1_{эк}$, while that of the past labor increases: $T^0_{сэ} < T'_{сэ} + \vartheta'_{сэ}$, but, in such a way, that total labor costs per unit of product decrease, $T^0 > T^1$.

This general rule assumes various versions of the effective introduction and utilization of the new equipment.

a) Costs of embodied labor remain constant, while that of living, labor are reduced. In this case, the effectiveness of new equipment is determined by freeing the labor force and saving the wage fund. When the shift coefficient of the work of robots, manipulators and other equipment is increased at enterprises, there occurs a combination of trades, a reduction in outdated work positions, etc. (Fig. 2a).

$$\vartheta_2 = T^0 - T^2 = T^0_{ж} - T^2_{ж} = \vartheta^2_{ж},$$

i.e., the effectiveness of introducing new equipment is determined by saving living labor.

b) Living labor costs remain the same, while those of embodied labor decrease. In this version, new equipment and technology make it possible to save raw and other materials, electric power, fuel, etc. At the same time, the cost of producer goods per unit product is reduced and the equipment capacity is increased. The effectiveness of new equipment is determined only by past labor. Graphically, this can be represented by Fig. 2b:

$$\vartheta_3 = T^0 - T^3 = T^0_{ов} - T^3_{ов} = \vartheta^3_{ов}.$$

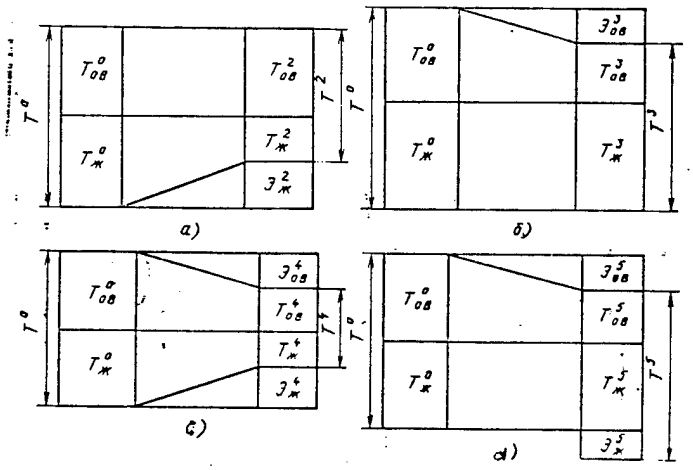

Fig. 2. Arrangement for determining the economic effectiveness of new equipment (versions a, b, c, d).

c) Costs of living and past labor are reduced simultaneously (version in Fig. 2c).

$$\Theta_4 = (T^0_{ов} - T^4_{ов}) + (T^0_{ж} - T^4_{ж}) = \Theta^4_{ов} + \Theta^4_{ж}.$$

d) Costs of living labor increase, while those of embodied labor decrease, but the increase in living labor is exceeded by saving embodied labor (see Fig. 2d):

$$\Theta_5 = (T^0_{ов} - T^5_{ов}) - (T^5_{ж} + \Theta^5_{ж} - T^0_{ж}),$$

where Θ_5 -- saving in total labor cost (living and past); $T^0_{сэ}$ - $T^5_{сэ}$ -- costs of past labor in the basic and planned (report) periods; $T^0_{эс}$ - $T^5_{эс}$ -- costs of living labor in the basic and planned (report) periods; $\Theta^5_{эс}$ -- saving in living labor; $\Theta^5_{сэ}$ -- saving in embodied labor; $+\Theta^5_{сэ}$ -- overexpenditure of embodied labor; $+\Theta^5_{эс}$ -- overexpenditure of living labor.

In all other cases, the cost ratios of living and past labor of introducing new equipment lead to negative results.

An important indicator of effectiveness of the introduction of new equipment is the capital expenditure for the saving per unit of labor force. It must be kept in mind that the size of capital investment per relative saving in the labor force depends on the utilization time of the new equipment in which these capital investments are materialized. Under modern conditions, it is necessary to determine the allowable size of capital investments for saving the labor force from the viewpoint of economic effectiveness. It is obvious that their size is determined by a norm (coefficient) of effectiveness, established for a given sector and area of production, i.e.,

$$H = \frac{3 - \frac{R}{t}}{R},$$

where H.-- norm coefficient of effectiveness of additional capital investments; З-- annual saving of expenditures per unit labor force (wages with insurance benefits); R -- capital investments in saving per unit labor force; t -- service life of equipment from the economic viewpoint.

From here, the allowable size of capital investments for saving the labor force

$$R = \frac{3}{\frac{1}{t} + H}.$$

For example, the annual expenditures for saving the labor force are 20,000 rubles, while the norm coefficient of effectiveness was set at 0.15. For a 10-year service life of new kinds of equipment, for example, flexible manufacturing systems, the maximum capital investments for saving the labor force are 80,000 rubles.

$$R = \frac{20\,000}{\frac{1}{10} + 0{,}15},$$

The carrying out of measures of introducing new equipment requires new capital investments which, as is well known, will produce an effect only after some time interval (so-called lag), i.e., after the designed effectiveness indicators for labor productivity, productions cost, etc. have been reached. The effectiveness of capital investments is higher when the lag is shorter.

The version that must be preferred is, obviously, the one where, to reach one or another result, requires (as compared to others) less capital investment is required and which calls for the lowest production costs. The selection of the preferred version when one of them is achieved with minimum capital investments, while the other one has lower production costs, requires

a comparative measurement of the differences between capital investments and current production costs for all versions.

In such a case, the version adopted may become that one whose difference in capital investments will be repaid by savings in production costs during an acceptable time, i.e., near the norm time. The methodology for such comparative evaluations, as is well known, was developed in detail and has been used for a long time.

It is customary to assume payment time ($T_{ок}$) as the coefficient of comparative effectiveness. If K_1 and K_2 are values of capital investments, while C_1 and C_2 are values of production costs for two versions, then for $K_1 > K_2$ and $C_2 > C_1$ the repayment time is

$$T_{ок} = \frac{K_1 - K_2}{C_2 - C_1},$$

while the coefficient of comparative effectiveness is equal to the reverse value:

$$\frac{1}{T_{ок}} = \frac{C_2 - C_1}{K_1 - K_2}.$$

Choosing the preferred version of capital investments, when introducing new equipment, including GAP, from the number of the compared ones is one which is minimum by the method of reduced costs

$$E_н K_1 + C_1 = \min,$$

where $E_н$ -- norm coefficient of comparative effectiveness.

$$E_н = 1 : T_н,$$

where $T_н$ -- norm for repayment time; K_1 -- capital investments for compared version; C_1 -- production costs for the same version.

Indicator of reduced costs П establishes the relationship between the material-equipment of labor and labor productivity ПТ. By conversions, we obtain the expression for this indicator:

$$П = \frac{1}{ПТ}\left|Ц \cdot M_в + 3П + (H_A + E_н)\cdot Ф_в\right|,$$

where $M_в$ -- material-labor ratio; ЗП -- average wage (without payment from the material incentive fund; H_A -- amortization norm (in tenths of units); $Ф_в$ -- capital-labor ratio; Ц -- price of unit of material consumed.

Such are the general principles for determining the economic effect of introducing new automated equipment. We used the indicated methodological rules to calculate the most effective versions of flexible production systems at a number of machinebuilding plants in Leningrad. The improvement of methods for determining the economic effectiveness requires the establishment of capital investment values most preferable for given specific conditions, necessary to master the production of new products or the introduction of some technological-organizational innovation, taking into account the degree of progressiveness of automated system being designed or introduced.

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2291
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METAL-CUTTING AND METAL-FORMING MACHINE TOOLS

UDC 061.4:001.18

DESIGN FEATURES OF NEW GENERATION MACHINE TOOLS NOTED

Moscow MASHINOSTROITEL in Russian No 10, Oct 85 pp 5-8

[Article by O. B. Yuryev: "Largest Exposition of Scientific Technological Achievements"]

[Excerpts] The April (1985) Plenum of the CPSU Central Committee stressed that as the main strategic lever of intensifying the national economy and better utilization of the accumulated potential, the party is putting forward the cardinal acceleration of scientific-technological progress. It was noted also that revolutionary shifts are needed such as the transfer to new in principle technological systems and a new generation of equipment that have the highest efficiency, the reequipment of all sectors of the national economy using modern achievements of science and technology.

The largest interindustrial USSR VDNKh Exhibition of this year "Nauchno-tekhnicheskiy progress-85" shows visitors graphically how these urgent national economic problems are being solved today and the prospects for the development of science and technology in the very near future. Over 3000 exhibits in its 18 sections made it possible to take an unusual and exciting trip into the world of the scientific technological achievements of the country in all sectors of the national economy.

Machinebuilding occupied the leading position at the exhibition. The introduction of flexible complexes in this sector makes it possible to increase the productivity of labor 5 to 6-fold, reduce the production cycle to 1/7 and increase the equipment shift coefficient 2.5 to 3-fold.

An exhibit is shown of a flexible automated section (GAU) designed for machining various parts in small series production. The list of parts machined on this complex contains from three to one thousand items. The complex includes the following: a GPM [Flexible Production Module] consisting of a model STP 220PR machine tool and a model RM 104 robot for turning parts 16 to 120mm in diameter and weighing up to 5kg; a model 1720PF30 machine tool and a model M20P40.01 robot for turning parts up to 400mm in diameter and weighing up to 20kg; a GPM consisting of model MTs-1250KD machining center for machining 150 x 150 x 150mm parts (the number of GPM in the section is determined by the production program). Moreover, the section is equipped with an automated warehouse for storing a large product mix and a stacker crane with

three control modes: manual, semiautomatic and automatic by a computer through an ASU [Automatic Control System] ; a "Rotor-1" transport robot designed to transport, reload and position standard trays with tools, fixtures, intermediate and finished products; an automated work position for the dispatcher for receiving, transmitting, gathering and storing operational data from various levels of a computer about the operation of the technological equipment in theGAU, as well as for the control of the transport and storage system of the CPU, the transmission of control programs and necessary data in the mode of the implementation of the shift task; a section for the engineering preparation for production ASTPP [Automatic System for Technological Preparation for Production] GPS [Flexible Production System] for developing charts for manufacturing and calculating programs for NC machine tools.

The GAU automates the production process up to 85 percent, reduces the manufacturing cycle to 1/4-1/6, increases the equipment shift coefficient up to 2.5-fold and the productivity of labor 2.5 to 4-fold, while reducing production areas to 1/2-1/3.

The "Comprehensive mechanization and automation of production processes in the machinebuilding" division also presented a model LLJ-10 automatic rotor-conveyor line for manufacturing parts from thermal plastics with a productivity of up to 200 pieces/minute. The line is patented in a number of leading capitalist countries and, as compared to the best specimens abroad and in the country, increases the productivity of labor 4-6-fold, reduces unit electrical power consumption 1/2 to 2/3 and frees 12 to 20 workers due to reducing labor-intensiveness to 1/8-1/12. The economic effect of introducing the line is 200,000 to 300,000 rubles.

Of great importance in modern production is the higher durability of metal-cutting tools. The VNIIETO [All-Union Institute of Electrothermal Equipment] developed the NNV-6.6-I1 device for applying wear-resistant coatings to cutting tools of a wide product mix up to 200mm in diameter and up to 250mm in length. It consists of three units: a working chamber, mounted on a common foundation with a vacuum system, power sources and a control panel. The units are interconnected by plug-coupled connecting lines. The power supplies in the installation have smooth voltage regulation and a planetary device for rotating the machined articles. Moreover, reliable improved systems are used to monitor and control.

Specifications

Size of working chamber, mm	600 x 600
Number of electric arc vaporizers	3
Speed of coating deposition, micrometer/hour	13-40
Chamber pressure, Pa	6.65×10^{-3} -- 6.65×10^{-1}
Consumption of working gas, nl/hour	0-30
Consumption of cooling water, m^3/hour	2.0
Size, mm	3000 x 3150 x 2070
Weight of installation with complementing equipment, kg	3400

The installation is highly productive and the costs of installation and start-up are low.

Another direction for solving the problem of increasing the accuracy and quality of machining parts made of hardened steels, cast iron and other difficult to machine materials is to create a tool equipped with polycrystalline superhard materials such as cubic boron nitride of the "belbor" type and "elbor-RM." However, one of the difficult problems in tool production is attaching the polycrystalline superhard materials in the tool holders.

The Physics of Solids and Semiconductor Institute of the BSSR Academy of Sciences offered to exhibition visitors biplates with a cutting layer from the superhard "belbor" material on a hard alloy substrate, which could be brazed to the tool holder without the loss of physio-mechanical and cutting properties. Moreover, the institute developed a method for synthesizing the biplates and the technology of producing round plates 6mm in diameter and 3mm thick. The cutting properties of the proposed plates are on the level of the best brands of "belbor" type polycrystals.

High physio-mechanical properties of the plates make it possible to use them in various metal-cutting tools for machining parts made of cast iron, hardened steels with an HRS hardness of 40 to 66 and other difficult to machine materials. The tool equipped with biplates provides highly precise machining (class 1-3) and low surface roughness (1.25 to 0.16 micrometers). A great advantage of the plates is that they can be easily and reliably brazed to the tool holder by the usual method in air using brass solder. They can be used successfully as a cutting component of various metalworking and drilling tools, disk saws for cutting wood-particle boards, etc. The strong security of the plates in the tool holder makes it possible to rough, semifinish and fine machine parts with a cutting depth of 0.5 to 1mm.

Universal epoxy paste occupies a modest place at the exhibition. It is small but expensive. The paste developed by the Ufa "Khimprom" Production Association has indicators at the level of best of Soviet and foreign analogs. It is designed for pasting together and in combination with metals, plastics, wood, ceramics, glass, hard rubber, leather and any other materials (with the exception of fluoroplastic and polyethylene). The paste can be used for facing, filling cracks, making various small articles by filling forms with the paste and subsequent solidifying at room temperature. The hardened paste connection can be machined and painted.

The advantage of the paste is that there are no volatile components which makes it possible to solidify in cold air, as well as when heated. A simple contact is sufficient for pasting articles together. The solidifying time of a pasted seam is not less than 24 hours at 25°C. The strength of a pasted connection for example, for steel is greater than 100 kg-force/cm^2.

The mechanization and automation of production under modern conditions are unthinkable without the wide use of computers. It is precisely for this reason that computers and microprocessors obtained one of the most honored

places at the exhibition. It would seem that children who came to the exhibition with their parents, sitting down in front of school computers and painting colored pictures on the display screen are merely playing. Actually, however, they were getting As in mastering complicated computer technique. Years will pass and they, perhaps, will sit at control panels of computer complexes without which it is already impossible to imagine modern production.

Consumer goods occupied a special place at the exhibition. A part of them is manufactured by machinebuilding enterprises: these are modern two-chamber refrigerators; car trailers, bicycles, motorcycles, ovens for the automatic preparation of potato dishes, children's toys, etc.

The "Scientific Technological Progress-85" Exhibition not only demonstrated graphically the achievements of our national economy, but also posed the problems of eliminating shortcomings and lags in individual directions, and outlined ways for the further development of domestic science and technology. In coming to meet the 27th party congress, the Soviet people today are laying the basis for new successes in accelerating scientific technological progress. The "NTP-85" Exhibition is convincing proof of that.

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OTHER METALWORKING EQUIPMENT

GOSPLAN, MINISTRIES CRITICIZED FOR NEGLECTING LASER TECHNOLOGY

Moscow SOVETSKAYA ROSSIYA in Russian 13 Feb 85 p 3

[Article by V. Katulin, director of the Kuybyshev affiliate of the USSR Academy of Sciences' Physics Institute imeni Lebedev]

[Excerpt] In our country, great importance is attached to development of the latest technology, including laser technology, on a profoundly scientific basis and introduction of this technology into industrial production. It was for this purpose that an inter-agency scientific-technical council on problems of laser technology was created under the USSR State Committee for Science and Technology and the presidium of the USSR Academy of Sciences. A scientific research center for industrial lasers has been organized, and an affiliate of the USSR Academy of Sciences' Physics Institute imeni Lebedev has been opened in Kuybyshev to specialize primarily in the development and introduction of lasers.

Unfortunately, all of these major organizational measures have not yet received industrial support. Industrial lasers which would meet the country's great needs still have not been put into industrial production, specialist training has not been organized on the necessary scale, and scientific centers for the introduction of laser technology have not been formed in many industrial cities.

What explains this situation? The primary reason apparently is underestimation of laser technology in the State Planning Committee, ministries and agencies, where it clearly is still viewed as only a long-term scientific experiment whose introduction need not be rushed. After all, there is no other way of justifying the fact that not a single enterprise for the industrial introduction of lasers has been designated to this day. And isn't this why it is the case that all that has been done to date is to create a research center and a scientific-technical council on problems of laser technology, while there is in fact no organization--neither a centralized nor an agency-affiliated one--which could engage in practical introduction of completed scientific developments in the field of laser technology? Industry proves in fact to be cut off from science.

The situation in which the affiliate of the USSR Academy of Sciences' Physics Institute in Kuybyshev finds itself is clear evidence of one-sided

emphasis on science in the advancement of laser technology. The affiliate is still the country's only regional scientific center for developing industrial lasers and laser technology and introducing them at industrial enterprises.

The affiliate is located far from enterprises, in quarters that are old and cramped and not well suited for conducting research. Even with the assistance of the Kuybyshev Oblast Communist Party Committee and the oblast soviet executive committee, the start of construction of the affiliate's own engineering-laboratory building was not achieved until 1985, and this took tremendous effort. This building is badly needed for development of even test prototypes of lasers. The total staff of 230 that we have been allotted (which is several times smaller than the number originally specified) is incapable of providing the design and mechanical work for the whole program that has been outlined by the institute.

Enterprises demand, with good reason, that we demonstrate what we are capable of and what they should invest their capital in. But we cannot do this, cannot show ourselves to best advantage, because we lack even the minimal facilities for this.

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OTHER METALWORKING EQUIPMENT

VORONEZH MACHINE BUILDERS DEVELOP NEW PRESS

Moscow TRUD in Russian 11 Aug 85 p 1

[Article by V. Zhuravlev, engineer: "Press -- to All Presses" (Voronezh)]

[Text] Voronezh machinebuilders created a special design complex for die forging metal. It makes it possible to automate production to a maximum, for example, about 100 parts for the "Don-1500" combine. The first such machine was sent to the "Rostelmash."

A crane grips a stack of metal strips and lowers the almost 5-ton load into the transporter of the four-man high complex.

"From that moment, it begins to operate without human interference," stated G. Artsybashev, chief of the automatic line department of the Main Design Bureau of the Voronezh Heavy Mechanical Press Manufacturing Association.

True: the magnetic arm lays the upper plate on the transporter. A mechanical "arm" directs it to the die forging space of the press. One instant, and a finished intermediate product for a "Don-1500" Combine sprocket is in the packing box. Several seconds -- and it is followed by a second, then a third one...

"The complex can stamp 700 parts in an hour," continued Artsybashev. "Manually, it is possible to manufacture not more than 300 during this time. By the way, the complex is "trained to stamp not only sprockets..."

B. Filomenko, deputy chief of the Electrical Drive Design Bureau Department, demonstrating the possibilities of its child, presses the keys of a portable panel and crossrails begin to fall into the packing box with the same speed and later, after a corresponding instruction -- other parts also.

The innovation of the Voronezh press-builders has no equal in the country or abroad. It is protested by five patents of the plant innovators, the main innovation being the automatic readjustable feed of the metal strips. The authors of this invention: G. Artsybashev; B. Filonenko; V. Gubar, leading designer of the complex; V. Gostev, leading designer of mechanization facilities, and I. Filkin, chief designer of the association, spent much time to make the complex competitive in the world market. The introduction of the machine in the national economy will make it possible to automate the die

forging process for parts made of strip material. The readjustable means for automation, and digital indication devices provide "flexibility" of the designed machine for stamping a wide list of parts. In this case, a man is freed from heavy, tiring work, while the productivity of labor increases 2.4-fold. The use of the new complex will save 114,000 rubles annually.

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OTHER METAL WORKING EQUIPMENT

NEED TO IMPROVE SERVICE LIFE OF CUTTING TOOLS NOTED

Kiev RABOCHAYA GAZETA in Russian 22 Mar 85 p 2

[Article by I. Ordinartsev, deputy USSR Minister of Machine Tool Building and Tool Industry: "Tools"]

[Text] The USSR Minstankoprom [Ministry of Machine Tools and Tool Industry] considered the questions posed in the article "Tools" published in the RABOCHAYA GAZETA on 6 December 1984.

The improvement in quality of manufacture and especially an increase in the operating standard of cutting tools and fixtures are a considerable reserve for increasing the productivity of labor in machinebuilding. Therefore, we consider the publication of the "Tools" article in the newspaper of the republic timely and important.

The USSR Minstankoprom along with the USSR Gossnab give constant attention to improving the operation of the cutting tool and its thrifty and efficient utilization. In the last three years alone specialists of the GSPKTB [State Special Planning-Design Technological Bureau], "Orgpriminstrument" and territorial administrations of the USSR Gossnab have investigated 3700 enterprises. It was found that the tool utilization coefficient on the average does not exceed 0.55, i.e., practically only a part of its possible operating life is utilized. Yet, breakages reach 30 to 50 percent. For example, at the same Kharkov "Elektrotyazhmash" Plant, described in the article, 30 percent of the tools are broken. At the Krobychsk Drill Bit Plant, the breakage is up to 60 percent.

Progressive cutting tools that make it possible to increase the productivity of labor and the quality of machining metals are introduced slowly. The share of cutters, for example, equipped with interchangeable sintered carbide inserts is 15 percent on the average, while it is even lower at some plants. At the same time, it is 50 percent at leading plants. New mineral-ceramic and superhard materials (without tungsten) are being introduced slowly.

The newspaper correctly posed the question of the shortcomings in the manufacture of tools and fixtures at the machinebuilding enterprises own shops. An analysis made by the Minstankoprom at the Agricultural Machine Plant imeni Ukhtomsk indicated that the list of standard tools of their own manufacture

can be reduced by a minimum of 30 percent. The same situation exists in many plants.

Ministries and technological organizations of machinebuilding sectors, as is entirely correctly stressed in the paper, must pay considerably more attention to improving tool management in their enterprises and reduce the production of standard tools and fixtures by their own forces.

The questions of sector and, especially intersector regional cooperation raised in the paper, are too complex and can hardly be solved by a stereotype. Difficulties originate because regions contain enterprises which produce different products and use different specialized tools. It is Minstankoprom's opinion that it is advisable to start cooperation by creating regional centers for applying wear-resistant coatings which could function at territorial organizations of the Gossnab. In any case, this question requires an all-sided study and, possibly, carrying it out as an experiment.

The Minstankoprom considers that problems of providing the national economy with modern metal-cutting tools and fixtures and measurement devices, especially for progressive technologies and automatic processes, must be solved by mandatory improvement of tool production of the machinebuilding's own sectors of industry. That is the same point, which is stressed in the "Tools" article.

2291
CSO: 1823/017

OTHER METALWORKING EQUIPMENT

BRIEFS

POWER LIFT TRUCK -- One of the most important goals of the five-year plan period, the "Armavto" Production Association Power Lift Truck Plant, is being created in Charentsavan. This enterprise will become the largest supplier of this product not only in our country, but also in Europe. Many enterprises in the country, as well as a number of firms abroad, participated in the creation of the plant and its technological equipment. A powerful electrical arc furnace received from Novosibirsk is being installed. It was manufactured by the collective of the "Siblitmash" Plant. An automatic molding line, received from the GDR, is being installed at a rapid rate. This powerful line will produce 45,000 tons of castings per year for the needs of the plant. [Text] [Yerevan KOMMUNIST in Russian 28 Mar 85 p 2] 2291

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AUTOMATED LINES AND AGGREGATED MACHINING SYSTEMS

COST, BENEFIT ISSUE ADDRESSED REGARDING FMS, ROBOTS

Moscow SOVETSKAYA ROSSIYA in Russian 25 Feb 85 p 1

[Article by G. Kulagin, Economist]

[Abstract] In contrast to the well-organized production of machining centers and computers, the development of robots, automatic storage/retrieval systems, transport devices and flexible manufacturing systems [FMS] is poorly coordinated. Now that research has progressed beyond purely technical matters and into the area of practical implementation, the various plants, research institutes and educational institutions engaged in this research must coordinate their activities more closely. FMS, machining centers and robots must be economically evaluated, since they provide cost benefits only when operated round-the-clock, 365-days-a-year; their high cost means that one- or two-shift operation is not justified. Enterprises acquiring robots and FMS must above all ensure better supply and production organization in order to increase the actual equipment operating time. While implementation of this equipment will reduce the number of machinists needed, factories will need more programmers and electronics technicians; any loss of experienced machinists is undesirable. Reliability of FMS, and particularly of their auxiliary devices, must be improved. In many cases, the price of progressive equipment, which is increasing faster than its efficiency, should be reduced. In 1983, the average numerically controlled machine tool cost 53,000 R, or 5 times as much as the average machine tool.

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AUTOMATED LINES AND AGGREGATED MACHINING SYSTEMS

FLEXIBLE MANUFACTURING MAKES INROADS IN ESTONIAN INDUSTRY

Tallinn SOVETSKAYA ESTONIYA in Russian 19 Jul 85 p 2

[Article by A. Favorskaya under the "Setting the Course Toward Scientific-Technical Progress" rubric: "Aiming at a Flexible Manufacturing System"]

[Abstract] Magnetohydrodynamic [MHD] and linear electric drives are the main topics of research by the Department of Electric Drives, Tallinn Polytechnical Institute [TPI], and its sector scientific-research laboratory of electric drives and automated process control systems. MHD drives are used to pump molten metal, while linear drives can move conducting solids, such as copper plates. The laboratory's work is oriented toward the foundry industry, where the need for mechanization is great. The scientists have developed MHD molten-metal pumps and rotary pouring machines with MHD and linear drives. TPI is also working on flexible manufacturing systems and automatic storage/retrieval systems. Its researchers have developed manipulators for X-ray inspection of welds and castings.

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AUTOMATED LINES AND AGGREGATED MACHINE SYSTEMS

RECENT EXPERIENCE WITH FLEXIBLE PRODUCTION SYSTEM RECALLED

Moscow SOVETSKAYA ROSSIYA in Russian 21 Aug 85 p 3

[Article by Boris Gerasimov under the rubric "Resources for Innovative Search": "The 'Energiya' Formula"]

[Text] The introduction of flexible automated procedures, created by scientists and practical experts, has increased labor productivity six-fold.

The birth of advanced experience always means initiative. Nowadays collective names are heard with ever increasing frequency: the Shchekino and Vazov methods, the Orel constant... And this is not accidental. Contemporary conditions marked by advanced experience, as a rule, require appreciable changes in the organization of production, planning and wages, which means changes in the efforts of multitudes of people -- of like-minded collectives. The experience of Energiya NPO [Scientific Production Association], which we will be discussing, was also born of a collective. At the CPSU Central Committee conference on problems of accelerating scientific and technical progress, Energiya NPO was named as a shining example of our machine-building industry's potential. Flexible automated sections of the association, equipped with domestic machining centers and computer technology, have increased labor productivity six-fold!

The shortage of specialized skilled workers, particularly qualified machine-tool operators, is too great in our country. The entrances of big and small plants alike abound with "help wanted" notices. Statistics confirm that on the average throughout the country there is only 0.7 operator for every machine tool. It is understandable why a lot of equipment operates at only partial capacity.

If we do not adopt fundamental measures, it will soon be necessary at machine-building enterprises to concentrate all growth in the work force. The only path to follow -- and this rang forth with special resonance at the June CPSU Central Committee conference on problems of accelerating scientific and technical progress -- is to transfer maximum capacities to technology requiring few people and to provide flexible automated production everywhere. We need not extensive, but intensive methods determining the success of the common cause not by numbers, but by know-how, capable of fulfilling the growing

planned tasks with the least number of workers.

...We are at Energiya NPO, in one of the plant sections where the flexible production system (GPS) was created. In the area are standing what look at first glance like ordinary lathes. Adjuster Viktor Pimenov and technologist Aleksandr Tormyshev are showing what they have produced. The metal machine part, covered with numerous openings, depressions and transitions to different levels, looks like a fanciful labyrinth. This one-piece, monoblock structure is used in a complex hydraulic apparatus. It is striking that such a complicated piece was manufactured in only three weeks, although hundreds and hundreds of technical operations were required for this -- milling, drilling and jig-boring.

"If it hadn't been for the flexible production system," explained chief of the automated management systems (ASU) division Aleksandr Fedorovich Strekalov, "the manufacture of this element on ordinary machine tools would have taken exactly... half a year, with extra-skilled operators at that. And even then it is not clear whether we would have succeeded in achieving the necessary accuracy. That's what the flexible production system is."

The shop section's technical and operational data speak even more graphically about the system's advantages. Work there is organized around the clock with a full work force -- 12 in the first shift, 6 in the second and 3 in the third. And the very high percentage of machine-tool equipment utilization in individual or small-series production is of no small importance. Transition to a new machine part of whatever complexity and configuration is ensured by a timely adjustment of the electronic brain to the needed mode.

The section, where long-range flexible production systems have been introduced, is not the only one at Energiya NPO. How did the plant succeed in rigging the shop with the most modern equipment and technology, about which others can only dream for the moment?

Here we cannot avoid telling about the cooperation of scientists and practical experts.

Sometimes you can hear from scientists that industrial workers do not like science and do not chase after innovations. No less frequent are the counter-reproaches: scientists, say production workers, only invent, while the question of introducing the innovations does not interest them much. And what can we say, both of them are right. Even when there is complete mutual understanding, when precisely what was wanted for production emerges from the scientific research institute, the plant enters into conflict with the plan. And it seems that when new equipment is being introduced or the enterprise is being renovated it is impossible to manage without correcting the program. Can the interests of science and production be reconciled? The experience of Energiya NPO shows that the problem can be solved when there is a desire to do so.

"Energiya" clearly lives up to its name. Energetic people work there, people with initiative and unconventional thinking, with the aspiration to do

everything well, in a business-like way.

For instance, machines tools with NC (numerical control) have become established in the shops of the scientific production association since 1959. Higher results were quickly achieved on the new equipment. But no matter how good the machines with NC, they only solve a part of the complex task. And if they are not supported in time with appropriate programs, the advantages of the new technology are reduced in practise to nothing. Judge for yourselves what kind of efficiency we can speak of if the machine tool has turned out all the parts and the manufacturing engineers are still only beginning to think about working out the new program. That is why at Energiya NPO the organization of production and automated management systems were thought of in advance: from the level of enterprise administration to the level of managing each machine tool and each work station. Naturally, the automated management system was not created just by itself; the development peculiarities of the shops and the production as a whole were taken into consideration. The main task was defined: to introduce a group of new automated management systems based on integrated automation and the mechanization of production processes. Young engineers set about developing an "electronic brain." They proposed their interesting decisions. And the main thing is that it was not just words but metal and electronic diagrams, mathematical programs and specifications.

Time has set new tasks. In the NPO they decided to utilize the most complex, so-called lower level of automated management for every section, machine tool and technical operation. Of course, not everything went smoothly and simply; there were moments of joy and of bitter disappointment. But the enthusiasm and desire helped, as did the aid of NPO managers and party organization leaders. In brief, the specialists really got close to the important task of automation -- a coordination of the heterogeneous technical resources of electronic computers, machine tools and mechanisms in a unified production complex with a single control. To solve this complicated task by themselves, of course, was not possible. Scientists from the Cybernetics Institute of the UkSSR Academy of Sciences came to collaborate with them. An extremely unusual meeting took place then between the greatest specialist in the field of cybernetics, Academician V. M. Glushkov, and the managers and engineers of Energiya NPO.

"You have a decent scientific project under way here, and not just a directive but the desire to deal with complex problems. The tasks you have set are quite realistic," said the academician. "However, I want to warn you right off: wouldn't it be better for you to establish direct contacts? Otherwise, it can be a year and a half or two before everone comes to an agreement in a given instance, before they give their 'okay,' their official stamps and signatures..."

A direct cooperation agreement was signed immediately. And then both collectives got to work right away. The ministry approved and supported the needed venture. The unconventional, direct path of cooperation between the two organizations brought more palpable results each day. It is noteworthy that at the same time an unspoken rule was in action: nothing extraneous. Otherwise it would have been as it usually is: an automated management system is introduced in one place and later on additional personnel is required to service it. By

the way, in the framework of cooperation both sides moved away from the classic "interrelations." For instance, specialists exchange results of their search directly in their own echelons, and not stage by stage... Scientists from Kiev and engineers from Energiya NPO have been passing results directly on to the user: the technologist, foreman, adjuster or machine operator. Specialists have been developing programs and mini-computers, and have achieved a switch from the old equipment to "new tracks." Even the warehouse clerks have had to give up the usual ways of working.

"We were scared at the beginning, of course," said Nadezhda Arkharova, former warehouse clerk and now operator-technician for servicing the automated warehouse. "Some didn't believe they could master the subtleties of the electronic controls. But now we see our fears were in vain. And it is so nice to work without the high stepladders and not have to lift heavy weights. The computer even does our inventory for us."

It is also extremely important that the current renovation and the introduction of scientific and technological achievements are not accompanied by the "traditional" expenses. The mathematics were developed by the cybernetics specialists together with the engineers from Energiya NPO. They have already been applied to existing systems at the enterprise. Thus the foundation has been laid, the real contours of future technology. It is here that the first flexible production system for mechanical machining was introduced. Multi-operational, dependable equipment for machining complex housing parts was required in order to develop it. Such equipment was manufactured only by the Ivanovo Machine-Building Production Association imeni 50-letiye SSSR. Its machine tools and machining centers automatically carry out basic and auxiliary operations and replace the labor of highly qualified professional machine-tool workers.

In January 1983, a meeting took place between specialists from Energiya NPO and the general director of the Ivanovo association, Vladimir Pavlovich Kabaidze. The discussion was specific: to use the theoretical and practical experience of people from Ivanovo, Kiev and Energiya -- experience gained in working out and introducing elements of the future flexible production systems, and to take advantage of the presence of qualified specialists in the three enterprises in order to develop and introduce at Energiya NPO a flexible production system (based on a new generation of Ivanovo machining centers) for putting out complex housing parts.

To tell the truth, the proposal was a little unexpected for Kabaidze. "I don't know, I don't know!" said Vladimir Pavlovich. "Now if you promise a sharp increase in the capacity coefficient and capital-output ratio, so they generally exceed the national average, then we'll look at it next week, without putting it off."

Kabaidze kept his word and arrived with a group of the association's leading specialists. Once again the collaboration of science and production received an appreciable impetus and acquired one more active ally -- the Ivanovo machine-building association. And at the shop's entrance appeared the words: "Ivanovo - Cybernetics - Energiya."

Judge for yourselves, the first flexible production system was designed and introduced at Energiya in only a year, the second in no more than 6 months. Now the flexible production system supplies a considerable volume of the mechanical machining of parts. The "Ivanovo - Cybernetics - Energiya" collective is creatively resolving new and more complex tasks. The experience of Energiya NPO and its collaborators shows that the success of a venture is largely determined by the personal initiative of the specialists, the administration and the party organization. The main thing is to unite the forces of science and production.

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